Gas Journal

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Editorial Notes

The King's Speech

NOTWITHSTANDING the fact that the attention of Parliament during the coming Session must so largely be devoted to foreign affairs, the King's Speech outlines a vast programme of domestic and social legislation. Much of this legislation will affect the Gas Industry either directly or indirectly; for to-day there can hardly be any measure of importance which has not some bearing upon the larger industries of the country.

It would be of interest, and by no means without profit, to go through the Speech phrase by phrase, and to consider in the case of every proposal the effect which future legislation on the matter may have upon the business of selling gas. In our view there would be few indeed that did not bring new suggestions as to fresh uses for gas or as to improvement in existing services. From the point of view of the Industry the place of paramount importance must, of course, be given to the Bill " for the furtherance of reorganization in the coal mining industry." In many ways the coal industry has our sympathy; it is an industry that no Government seems able to leave alone. While it is fashionable in present Government circles to disclaim, with pious horror, any suggestion of the complete nationalization of the Industry, the finger of bureaucratic control is heavy. The Coal Mines Act has placed immense and monopolistic powers in the hands of the coal owners, and the policy of the Mines Department appears to be to ensure that those powers are used to the full.

Although the Act has few friends and many enemies, there is no hope that the policy of the centralized selling of coal will be abandoned. It is therefore the more essential that adequate protection should be granted to the consumer. Even if the constitution and procedure of the present Committees of Investigation were perfect—which is far from being the case—these Committees would be ineffective because they cannot go outside the policy of the Act. What is the use of complaining to a Committee of Investigation that there is price discrimination, when the Act expressly permits such discrimination? What good can come of contending that the price of gas coal is excessive when the Schemes, lawfully made under the Act, require the coal owners to obtain the best price possible? It is useless to mince words over this matter: the Gas Industry, together with those of electricity and water, demand that obligations to which they are subject with regard to supply, price, and undue preference should be applied to the basic industry of coal.

After the Coal Bill, the measure which will probably attract the greatest attention from our Industry is undoubtedly the Electricity Bill. On this matter we had occasion to comment last week and we repeat our conviction that disaster is certain if the Government fail in their recognition of the economic importance of the Gas Industry. That the path of the Government will not be smooth in dealing with electricity is obvious. The much advertised Grid scheme initiated in 1926 has failed to bring the cheap electricity which was promised; it is now realized that the cost of distribution is a more important factor than the cost of generation.

Electricity Proposals

THE McGowan Committee has put forward certain recommendations with regard to distribution. The Government have declared that they intend to adopt the McGowan Report in principle, but have as a basis of legislation put forward a Memorandum which is alleged to be contrary to the Report in several material respects.

The vast majority of those who have been asked to comment on this Memorandum have commented unfavourably, and it is more than probable that the most virulent criticism of the new measure will come from within the electricity industry itself. In the *Fuel Economy Review*, issued by the Federation of British Industries, an eminent member of the electrical industry offers a timely warning that " whenever a further degree of public control is thought necessary, the proposals are

made as palatable as possible to the greatest number of voters, viz., the domestic consumers;" and he refers to the baneful effects of the application of political principles in Canada where domestic supplies and equipment are practically given away, " whereas every industry in the city has protested in vain for a reduction in the high rates for power supplies."

The Speech from the Throne also envisages an amendment of the financial provisions for slum clearance as an improvement of housing conditions. Although the immediate effects of slum clearance may often result in heavy financial loss to the local gas undertaking, the Industry recognize and welcome the excellent work which the Government have achieved in this direction. The existence of slums is a blot on our national credit for which the Industry is in no way responsible; indeed, it may be claimed with justice that such amenities as the slum dweller possessed are frequently provided in the form of cheap and efficient lighting, cooking, and heating by the Gas Industry. Such service the Industry is ready and able to provide in the improved housing conditions which the Speech forecasts, and it is essential that no official favouritism of electricity on the part of local authorities should be allowed to keep from the public the great benefits which gas can bestow. As Mr. Justice Farwell recently said with regard to the relations of statutory gas and electricity companies—" The public have an undoubted right to determine for themselves whether they will use electricity, or whether they will use gas, or whether they will use both."

The final matter of interest for us in the King's Speech is the proposed Bill to regulate wages and conditions of employment in the transport of goods by road. This is, of course, a reference to the Report of the Committee on the Regulation of Wages and Conditions of Service in the Road Motor Transport Industry which was issued in May last.

The problem with which the Committee dealt was whether the wages of the drivers of C Licence holders should be regulated in the same manner as those of the drivers of A and B licence holders. If the Committee had so recommended, it would have introduced external compulsory wage fixing machinery applicable to a small section of gas workers whose occupation as drivers might not by any means constitute the whole of their employment. Fortunately the Committee, having heard the views of the Federation of Gas Employers, recommended that a C Licence holder " shall be deemed to pay fair and proper wages if he observes the wages and conditions determined by joint machinery for regulating wages and conditions, either for an industry as a whole or for a defined part of an industry, whether such machinery takes the form of a Joint Industrial Council, Trade Board, or other similar body which provides such machinery for fixing wages for employees driving motor vehicles."

Although this recommendation takes the sting out of the matter, the Report does contain certain minor suggestions with regard to which the views of the Industry will probably be considered before legislation is introduced.

The Speech concludes with the statement that " other measures will be laid before you and proceeded with as time and opportunity offer." It is impossible to forecast whether any legislation directly affecting the Gas Industry will be introduced under this omnibus clause. Whether this be the case or not, the prestige of the Industry stands as high to-day as ever, and there is no reason why the future should not be faced with the utmost confidence.

Organized Coke Marketing

Once again we have before us a further record of the successful application of organized coke marketing and price control in the London and home counties area, and it is abundantly clear that the policy which was adopted six years ago in the formation of the London and Counties Coke Association has been fully justified in all respects. The remarks of Mr. R. W. Foot—reported elsewhere in this issue of the " Journal "—in his capacity of Chairman at the Annual Meeting of the Association, indicate that there has been no standing still in their activities during the period which has elapsed since the last report; indeed, their work becomes increasingly important almost day by day. To use the words of Mr. Henry Woodall, the Association has done more in a short time to improve the balance-sheets of member undertakings than probably any other body we have known, and the all-embracing character of the organization may best be judged by the fact that membership now includes over 99% of all the coke produced for sale in the area.

To refer briefly to one or two of the more important achievements of the past twelve months, we would mention the completion of the Coke Distributors' Branch, which now covers practically everyone concerned with the distribution of coke in the area. This Branch has established, beyond all question, its value both to producers and distributors. Arrangements with the National Association of Heating, Ventilating, and Domestic Engineering Employers have also been completed, and the L.C.C.A. have set up a Joint Committee with the Heating Engineers which meets from time to time. It has been appreciated that while the latter deliberations are concerned primarily with coke, the opportunity for co-operation offered by contact with Heating Engineers should be extended also to gas, and heads of agreements in this respect have already been satisfactorily settled. This step alone should be sufficient to counteract any possible fears that the operation of organized coke marketing may be detrimental to the progress of gas.

Technical developments during the year have included investigations into coke for grass-drying and fog-lifting. We have already dealt fairly fully in these columns with the former, and, as regards the latter, preliminary designs for the practical application of coke heating units have actually been submitted to airport authorities, who are satisfied that the utilization of heat in the manner proposed would be sufficiently effective to lift fog 50 ft. from the ground and thus enable the safe landing of aircraft. This is indeed a development of national importance, and we shall look forward to hearing further details in due course. Much useful work had also been done in connection with the testing of coke-using appliances, and the Association are shortly to issue an approved list of such apparatus, which members are requested to recommend to the exclusion of others. Not only will this safeguard the interests of consumers, but it will serve a very useful purpose in bringing home to appliance manufacturers that unless their goods pass the tests which the Association consider necessary they will not be used by members. The technical service has also extended its activities in the direction of assisting members in the coke utilization problems with which they are faced from time to time. It is, perhaps, unfortunate that the Advertising Committee has not had sufficient funds at its disposal to enable it to be as active as it would have liked; but full credit is due to this Committee for the preparation of a number of useful brochures during the year.

An International Cartel

ANOTHER important step in which the L.C.C.A. has been concerned during the year was one which was foreshadowed in these columns some little while ago—namely, the formation of an International Coke Cartel for the regulation of the export market throughout Europe. The export market is a matter of considerable moment to the Gas Industry, the export of gas coke totalling nearly a million tons during the year. The arrangement, which has been made for a period of three years, provides for quotas, minimum prices, and serious penalties for breaches of the agreement, the member countries being Great Britain, Germany, Belgium, Holland, and Poland. The Association have co-operated in the completion of the arrangements for this International Cartel by the formation of a body called the British Coke Export Association, which in the first few months of its life has been successful in obtaining a membership of something like 75% of the total quantity of gas coke exports.

A central committee has been established to control the British interests in the International Cartel, and upon this committee the Coke Export Association have seven members representative of all the districts concerned in the export of gas coke. Membership of this committee brings with it close contact with the producers of furnace coke, and there is no doubt that this contact will have an important bearing upon the prospects of coming to proper arrangements at home between gas coke and furnace coke interests. Indeed, discussions in this connection have already begun, and a National Committee of the whole Gas Industry has been set up to go into the question thoroughly with a view to meeting at an early date a similar representative committee of the furnace coke interests. The London and Counties Coke Association—which is the only completely organized area in respect to coke marketing in the country—must obviously play an important part in all these discussions, and, indeed, they are to have three representatives on the National Committee.

The annual report of the L.C.C.A. once again establishes beyond doubt the need for similar organizations throughout the country—organizations run on similar lines with similar staffs. With the serious increase which the Gas Industry is being called upon to pay at the present time for its coal, the maintenance of its coke markets at a proper level has never been more vital, and while the existing position is that the demand for coke exceeds the supply, there is little question that some future date may see that position reversed. Unless in the meantime arrangements can be made for the proper control of coke markets throughout the country generally, the outlook may be very serious.

Combustion Characteristics

To the published results of the valuable work carried out by the Tottenham and District Gas Company on the effects of coal gas dilution on the satisfactory performance of the mixed gas at the burner Mr. P. C. Gardiner, Chief Chemist to the Company, adds further information in a Paper which will be found on later pages of this issue. The Tottenham investigation into the combustion characteristics of different mixtures of gases has been in progress for a number of years, and the outcome has proved of great service to other investigators in the same field. The subject is, of course, recognized as one of paramount importance; and, as one of the Reports of the Joint Research Committee of The Institution of Gas Engineers and Leeds University, submitted yesterday at the Autumn Research Meeting of the Institution, brings out so clearly, it is one of great complexity. It is a problem demanding much further experimental work.

It has already been demonstrated that constancy of calorific value does not ensure uniformity of combustion characteristics. Nor will the fixing of the specific gravity ensure that a bunsen burner will produce inner cones or flames with similar characteristics with different gases even when the calorific value of the gases is constant. These considerations have led to the design of a number of test burners for determining the quality or combustion characteristics of town gas; and the development in this country of one of these burners is due to Mr. F. O. Hawes, of the Tottenham Company, and his collaborators. This burner, based on the German work on the determination of Ott numbers, was dealt with by Mr. Hawes in the "JOURNAL" for Feb. 24 last, and in his Paper in our issue to-day Mr. Gardiner includes a sketch of this simple burner which has proved of immense practical value in ensuring a satisfactory supply of gas in the Tottenham area. The work described has served to focus attention on how important it is that the combustion characteristics of a gas should be subject to measurement in such a form that the behaviour of the gas in an appliance can be forecast with confidence. As Mr. E. V. Evans observed in a statement presented at the Institution Meeting yesterday, there exists to-day a wide range of calorific values declared by different undertakings and there are indications of a trend towards a narrowing of this range. When the time comes for any undertaking to contemplate a change in calorific value consideration has to be given to the effect of the alteration upon the performance of some thousands of gas burning appliances. The change in calorific value will probably involve a concomitant change in the specific gravity, and the hydrogen, methane, carbon monoxide, and inert content will probably alter also. Will the aeration of the burners, the freedom from noise, and completeness of combustion be adversely affected? These are the questions we should be able to answer with certainty.

Mr. Gardiner refers in his Paper to the work of Mr. C. A. Deas, also of the Tottenham Company, in regard to the dilution of coal gas by admixture of water gas and producer gas, and shows how helpful the Hawes burner has proved in keeping the composition of the gas such as, on test, to come within a definite range of Ott numbers. The regular tests carried out with the burner have been of great assistance in preventing trouble on the district. The Ott number can, it is shown, be of such value in enabling full advantage to be taken of the flexibility of carburetted water gas plant without undesirable repercussions on the district. By the use of the Ott number at the Company's Hertford Works and by admitting both producer gas and carburetted water gas to the coal gas stream it has been found possible readily to vary the carburetted water gas content from 0% to 30% without great difficulty.

Co-operation and Research

THE need for a greater measure of research in the coke oven industry has been emphasized by successive Presidents of the Coke Oven Managers' Association in recent years. In his Presidential Address to the Association at the very successful Annual Meeting of the Association last week Mr. G. W. J. Bradley urged the industry to increase its contact with the larger organizations whose sole object is research on a national scale. Close contact

between the research worker and the man controlling plant and processes is, of course, more than desirable; and, taking two particular examples, the liaison between the Fuel Research Board and the fuel industries, and between these industries and the British Refractories Association, has proved of the greatest advantage. Reference to the growing co-operation was made by Sir Harold Hartley and Mr. W. J. Rees at the Annual Dinner which followed the meeting. Sir Harold Hartley spoke of the importance of fundamental research as distinct from research into our daily problems; the Gas Industry realization of this was reflected yesterday in the Reports presented at the Autumn Research Meeting of The Institution of Gas Engineers and in the discussions to which they gave rise. This changed outlook on research is one of the happiest auguries for the extensive development of our Industry.

The value to the coke oven industry of the research work carried out on refractory materials was stressed by Mr. Rees, and it is a fact that refractory materials as they are known to-day have been developed as a result of fundamental research. Fundamental research into the intrinsic characteristics of silica made possible the effective use of this material as a refractory in the carbonizing industries. Mr. Rees also asked for some measure of standardization in coke oven refractories. He called attention to the way in which the Gas Industry has tackled this problem. Why should not the coke oven industry decide to accept the specifications of The Institution of Gas Engineers or prepare its own specifications?

Research and co-operation in problems of marketing are also necessary; and in the direction of coke marketing both Mr. Bradley in his Address and Mr. R. W. Foot at the Annual Dinner of the Coke Oven Managers' Association urged further co-ordination between the coke oven industry and the Gas Industry. The present boom in coke should not blind people to the fact that sooner or later there will be some degree of reversion, when the need for co-operation will become more apparent. It is now that the essential groundwork should be done by setting up a suitable organization. Now is the time for framing plans for minimizing the effects of a slump in demand. The London and Counties Coke Association has pointed the way; and it is to be hoped that national discussions will take place with a view to consolidating the position of coke sales throughout the country.

Forthcoming Engagements

Nov.

2 and 3.—I.G.E.—Autumn Research Meeting.

3.—British Gas Federation.—Annual General Meeting and Dinner, Grosvenor House, Park Lane, W. 1.

4.—S.B.G.I.—Autumn Meeting, May Fair Hotel. Council, 11 a.m.

4.—Midland Juniors.—Visit to Fuel Research Station, East Greenwich.

6.—Scottish Eastern Juniors.—Short-Paper Day at Edinburgh.

10.—Southern Association (Eastern District).—Meeting at Gas Industry House, 2.30 p.m. Discussion on "The Importance of Coke Service."

13.—Scottish Western Juniors.—Meeting and Paper by D. S. Davies on "Gas as Applied to the Textile Industry."

13.—Western Juniors.—Visit to Torquay. Paper on "Practical and Theoretical Aspects of Crude Benzole Recovery," by F. A. Butt.

17.—B.C.G.A.—Meeting of the Executive Committee, 11.30 a.m.

18.—I.G.E.—Gas-Works Safety Rules Committee, 2.30 p.m.

18.—Midland Association.—Autumn General Meeting, Grand Hotel, Birmingham.

18.—Midland Juniors.—Meeting and Paper by E. Haden on "Temperatures."

19.—Southern Association.—General Meeting, Hotel Victoria, 2.30 p.m. Paper by W. A. Bishop (Croydon) on "Developing the Heating Load with special reference to Gas-Fired Central Heating Installations." Committee meeting precedes at 12 noon.

19.—London and Southern Juniors.—Annual Dinner and Concert.

20.—Yorkshire Juniors.—Meeting at York.

23.—London and Southern Juniors.—Paper on "Heat Utilization in Carbonizing Plant" by J. H. Reber.

23.—I.G.E.—Pipes Committee, 2.30 p.m.

25.—I.G.E.—Purifiers Committee, 2.30 p.m. Gas-Works Safety Rules Committee, 3 p.m. [*The meeting of the latter Committee has been altered from Nov.* 18.]

26.—North of England Auxiliary.—35th Half-Yearly Meeting at Newcastle-upon-Tyne.

27.—Scottish Western Juniors.—Visit to Auchengeich Coke Ovens.

(*There will be no meeting of the Central Executive Board of the National Gas Council or of the Central Committee of the Federation of Gas Employers during the month of November.*)

Dec.

1.—London and Southern Juniors.—Visit to W. H. Allen's Engineering Works, Bedford.

2.—Midland Juniors.—Meeting and Paper by F. A. C. Pykett on "Re-selling the Cooker Load by Vitreous Enamelling."

4.—Manchester and District Juniors.—Visit to Manchester Oxide Company, Ltd. Papers by R. H. Clayton and H. B. Avery.

11.—Western Juniors.—Visit to Trowbridge Gas-Works. Paper by V. J. Borrett on "Works Extensions at Trowbridge."

11.—Scottish Juniors.—Joint Meeting at Glasgow. Address by G. Dixon (Junior Vice-President of the I.G.E.).

14.—London and Southern Juniors.—Meeting and Paper by A. T. Green on "Features Concerning the Use of Refractory Materials in Gas-Works."

1938.

Jan.

7.—I.G.E.—Joint Committee on Complete Gasification under Pressure, 3 p.m., at 16, Old Queen Street, S.W. 1.

1938 "JOURNAL" DIRECTORY

Sheets are now being corrected. The early return of outstanding forms will ensure inclusion of the latest particulars of Undertakings in the forthcoming Edition.

1937 "JOURNAL" DIRECTORY

Page 4. ASHTON-UNDER-LYNE. J. Taylor, S., deceased.

Page 22. DOVER. G. le B. Diamond appointed G.M., vice G. W. Anderson, retired; R. G. A. Clark appointed E., vice J. J. Paterson, retired.

Page 26. FORDINGBRIDGE. F. Taylor, M., deceased.

Page 34. HORLEY. B. Long, D. & G.M.; H. Huggett appointed S.

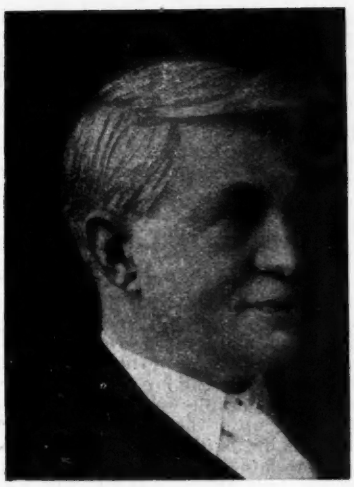
Page 50. NORTH MIDDLESEX. J. H. Dyde appointed E. & G.M., vice K. R. Gandon, retired.

Page 70. WADHURST. J. Wood, M., deceased.

PERSONAL

Dr. J. W. MELLOR, F.R.S.

Dr. J. W. Mellor, F.R.S., retired on March 31, 1937, from the position of Director of Research to the British Refractories Research Association, which he had held since the formation of the Association in 1920.



Joseph William Mellor was born on July 9, 1869, at Huddersfield, but was taken, when very young, to New Zealand where he was educated. He graduated with 1st Class Honours in Chemistry at New Zealand University. Awarded an 1851 Exhibition Scholarship he came to England at the beginning of the present century to work under Prof. H. B. Dixon at Manchester University. His most important work there was a comprehensive investigation of the reaction between hydrogen and chlorine. The results of this research were published in an extensive series of Papers in the Transactions and Proceedings of the Chemical Society from 1901 to 1904. Other Papers during this period indicate the range of his interest in chemistry generally—*e.g.*, Bunsen's Ice Calorimeter (J.Physical.Chem., 4, 135, 1900), the Estimation of Cyanides and Cyanates (Zeitanal.Chem., 40, 17, 1901), the Kinetics of Sugar Inversion (Zeit.phys.Chem., 48, 353, 1904, with L. Bradshaw). His book "Higher Mathematics for Students of Chemistry and Physics" also belongs to this period.

Leaving Manchester, he obtained a post as Chemistry master at the Newcastle-under-Lyme High School. Here in North Staffordshire he developed an interest in the local ceramic industry. In 1905, he was appointed by the Staffordshire Education Committee to organize the teaching of ceramics in the Pottery district. The classes were first conducted at Tunstall, later at Stoke-on-Trent in temporary premises, and eventually in 1914 in the newly-built North Staffordshire Technical College, Dr. Mellor becoming principal of the Pottery Department. On his retirement from this position in 1934, the Ceramic Department of the College had won an international reputation.

Coincident with Dr. Mellor's association with the teaching of ceramics is his association with the Ceramic Society. He was made Hon. Secretary in 1905 and still holds that office. Under his guidance the Society has grown from a local group of interested members to a national technological and scientific society concerned with the study of clay and refractory products of all types, and having members drawn from all parts of the country and abroad. His original Papers dealing with the technology of the Ceramic Industries have been published for the most part in the Transactions of the Ceramic Society and have won universal recognition for him. Dr. Mellor is an Honorary Member of all the existing Ceramic Societies in Europe and America. A volume of his "Collected Papers in Ceramics" is being published by Chas. Griffin & Co., Ltd., this year.

Despite Dr. Mellor's main preoccupation with teaching and research in ceramic subjects since 1905, his interest in pure chemistry has been maintained unabated. His numerous books bear testimony to this. There was his "Chemical Statics and Dynamics" (a standard text-book for University students) and his "Modern Inorganic Chemistry" in 1912 (a standard text-book for schools which was so popular that many editions have now appeared. Dr. Mellor has also written more elementary text-books on the same general plan). "A Treatise on Chemical Analysis" appeared in 1913 and has been widely used as a standard work on silicate analysis. In 1922 the first two volumes of his great work, "A Comprehensive Treatise on Inorganic and Theoretical Chemistry," were published to be followed by successive volumes at yearly intervals. The 16th and concluding volume is now in print. This work may be claimed as the standard reference book on Inorganic Chemistry all over the world. The prestige it won for him, coupled with his achievements in ceramic research, were recognized when he was made a Fellow of the Royal Society in 1927.

Dr. Mellor's Association with the Gas Industry dates from about 1908. At this time data on the properties of fireclay and refractory materials generally were very scanty. With the support of the Gas Industry he set to work at once to remedy the more serious deficiencies. His work on the texture of refractories and the refractoriness and refractoriness-under-load tests, for example, was of vital importance to the refractories industry. He was a pioneer also on measurements of the specific heat of fireclay and silica bricks. These Papers were the early steps in the way of standardization and the formulation of specifications which have reacted so well on the Gas Industry and other industries using refractories.

The development of the work on refractories (largely fostered by The Institution of Gas Engineers) led in 1920, with the support of the Department of Scientific and Industrial Research, to the formation of the British Refractories Research Association with Dr. Mellor as its Director of Research. Until 1934 the work was carried out in temporary buildings in the grounds of the North Staffordshire Technical College, but the Association then moved to its own premises which were named "The Mellor Laboratories" in recognition of the work done by its first Director. Dr. Mellor retired from the Directorship in April of this year, and was appointed its first President.

Dr. Mellor represents the New Zealand Government on the Board of Governors of the Imperial College, South Kensington.

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To mark his retirement after forty-three years' valued service, Mr. W. T. DUNN, Accountant to the Deal and Walmer Gas Company, was presented with a cheque by the Directors of the Company at the annual meeting on Oct. 23. The presentation was made by Sir David Milne-Watson, LL.D., D.L., Chairman of the Company, who expressed the hope that he would live many years to enjoy his well-earned rest. Mr. Dunn suitably voiced his thanks to the Board.

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Over 200 employees of the Exeter Gaslight and Coke Company met at the Company's showrooms on Oct. 26 to make a presentation to Mr. W. N. WESTLAKE, who, as already announced in these columns, recently retired from the position of Engineer and General Manager after 50 years' service with the Company.

The chair was taken by the Secretary, Mr. E. H. Dart, who referred to Mr. Westlake's untiring energy and exceptional ability as a leader and organizer. Others who associated themselves heartily with Mr. Dart's congratulations and good wishes were Mr. F. Wood, Mr. C. H. C. Webber, Mr. P. D. Down, and Mr. J. W. Bamsey (representing various sections of employees), and Mr. F. L. Allen (representing the Company's Sports Club).

The presentation, which took the form of an appropriately inscribed gold cigarette case, was made by Mr. S. E. Roper, who holds the record for length of service among the present employees. Mr. Westlake thanked his late colleagues for their gift and good wishes. He referred gratefully to the loyal and constant support he had received from them and felt confident that the same support would be given to his successor, Mr. H. H. Brown. A presentation was also made to Mrs. Westlake. Miss J. C. Shaw expressed the general appreciation of the very keen and active interest Mrs. Westlake had always taken in the social activities of the employees.

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Mr. G. W. ANDERSON has retired from the position of General Manager to the Dover Gas Company which he has held for over fifteen years, and Mr. G. le B. DIAMOND, M.I.Mech.E., M.Inst.Gas E., has been appointed to take over his duties in addition to those attached to his present position of Engineer and General Manager of the Folkestone Gas and Coke Company.

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Mr. J. J. PATERSON, Manager and Resident Engineer of the Dover Gas Company, has retired after more than

fifteen years' service, and Mr. R. C. A. CLARK, M.Inst.Gas E., Assistant Engineer at the Southend Station of the Gas Light and Coke Company, has been appointed to succeed him.

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Mr. J. H. DYDE, M.Sc., M.Inst.Gas E., who has been Acting General Manager of the North Middlesex Gas Company since Mr. K. R. Gandon retired last August, has been appointed Engineer and General Manager. Mr. Dyde joined the North Middlesex Gas Company in August, 1936, as Assistant Engineer and General Manager. He was previously with the Plymouth and Stonehouse Gas Company as Technical Assistant for three-and-a-half years, and as Sales and Technical Superintendent for four years. Mr. Dyde graduated successively in Science and Gas Engineering at Leeds University.

Following the Annual General Meeting of the Association of British Chemical Manufacturers on Oct. 14, Mr. E. V. EVANS, General Manager of the South Metropolitan Gas Company, was appointed Chairman of the Association in succession to Mr. Eben Wallace, of Imperial Chemical Industries, Ltd.

Obituary

Councillor JOHN BARRY, of Liverpool, who retired a few years ago from the position of Gas Meter Examiner with the Liverpool Gas Company, died on Oct. 28, aged 76. Councillor Barry had been in the service of the Liverpool Company for forty-five years.

Correspondence

Gas Producers for Transport

SIR,—I have read Dr. King's most capable article published in the "JOURNAL" of Sept. 15, and I notice that one of our daily papers selected the following paragraph which they appeared to regard as of outstanding importance:

> "If the whole of the tar made to-day was hydrogenated some 120 million gallons of motor spirit, or 9% of the national consumption, could be manufactured by the Gas Industry."

What effect would it have on the market if (say) 50% of the tar now produced was treated by hydrogenation. Seeing that most of the present production is absorbed for road making, the dye industry, plastics, and other requirements, obviously the price would go "sky high," and the dependent industries would be without their supplies.

In another part of his Paper, Dr. King refers to the most important subject of gas producer as a means of propulsion—a subject which has been criminally neglected in this country compared with other continental nations, but his information seems to be entirely behind the times so far as the low-temperature carbonization companies are concerned. Probably it has not come to his notice that recently the Fuel Research Board Station have tested a coke from non-caking coal in which the tar of which he complains was stated to be so small that it was impossible to measure it. I would point out that this highly reactive coke, consistently free from tar, practically free from clinker, and closely graded, is being produced in normal operation from non-coking coals by a low-temperature process, and is actually being marketed now. This coke possesses all the qualities which Dr. King so ably sets out for an ideal suction producer gas fuel; it can be produced very cheaply, and, when the demand requires it, unlimited quantities will be available. Why therefore should the Gas Industry institute expensive research to find out how to make something which already exists?

Judging by the results obtained in France, it is a comparatively easy matter to fix one of the well-known gas producers to almost any type of private motor car, lorry for transport, farm tractor, stationary engine, or motor barge without materially altering the construction of the engine. Another matter for consideration is that the "time taken up in getting the producer under way from cold" on this fuel is not from 5 to 10 minutes but less than 2 minutes. It would be of national importance if Dr. King and the Fuel Research Board realized that not only would 80% be saved in running cost, compared with petrol, but that the dangers with which this country is threatened in certain eventualities would be largely avoided if the use of such fuel were encouraged.

With respect I would suggest that the supplies of suitable coke cannot be available from the Gas Industry unless the methods of gas undertakings are entirely changed. They are available, however, from other sources without in any way upsetting the existing markets.

Yours, &c.,
RICHD. D. HARDY,
Chairman and Managing Director,
British Coal Distillation, Ltd.

King's Court,
48, Broadway, S.W. 1,
Nov. 1, 1937.

An Early Gas Fire

From *The Times* of a Hundred Years Ago

The following interesting little paragraph appeared in *The Times* yesterday and suggests that the gas fire was not a new idea even a century ago:

Our office has been much thronged this fortnight past with visitants examining the fire from gas which was lately noticed, and a considerable number of persons have given orders for fitting it up in their rooms and offices. . . . We learn that the gas fire is not new, as we supposed, but was discovered by the late Dr. Duncan, of Edinburgh, a number of years ago, and that it has since been in use in the College of Edinburgh for producing the heat necessary for some chymical experiments. . . . A few small pieces of lime, about the size of a bean . . . if laid upon the wire gauze, will soon become of a bright red, and add a more cheerful look to the fire.—*Paisley Advertiser.*

Cambridge Forges Ahead

Opening of New Showroom at Willingham

After providing the villages of Willingham, Oakington, and Longstanton with gas about twelve months ago, the Cambridge University and Town Gas Light Company, pursuing its policy of giving the best possible service to its consumers, has opened a new showroom at Willingham. The premises are conveniently situated opposite the village green, and are well equipped with fittings and appliances. The showroom is designed to allow the centre to be cleared at short notice for demonstrations.

The opening ceremony was performed by the Chairman of the Willingham Parish Council, Mr. G. W. Hart, on Oct. 11, and following the inspection of the showroom by a large company, tea was served in the Parish Hall. The Chairman of the Company, Mr. J. F. Cameron, M.A., presided, supported by Mr. Guy Dale, Director, Mr. J. Hunter Rioch, Engineer and Manager, Mr. A. E. King, Secretary, Mr. G. P. Banyard, Architect, Mr. A. Kidman, Builder, and several members of the Parish Council.

In his remarks the Chairman traced the history of the application for a gas supply to Willingham, which came from representatives of the Parish Council, and had been taken up without delay. With the completion of the showroom, it was now possible to show what service gas could provide, and it was hoped that soon a resident fitter would be available. With most of the houses now supplied with gas, progress had been satisfactory, but there was still room for more appliances.

That the introduction of gas was a great boon to the village was the opinion of Mr. Hart, who expressed appreciation at the manner in which the application for a supply of gas had been dealt with. He described the Directorate as one which had faith to believe that in the future its confidence would be justified. With the streets now well lighted, it was agreed that the additional sum required in rates was value, and more than value, for money. He felt that the rural districts needed education in the best use of gas, and was sure that after a time there would be increased consumption.

A vote of thanks to Mr. Hart was proposed by Mr. Guy Dale and seconded by Mr. Rioch, in which the need for fuller education in using gas was stressed, and tributes paid to the architect and builder of the showroom. The following week saw the showroom opened each day, when large attendances were recorded, and in the future it will be opened on two afternoons each week. Home laundering demonstrations were given daily, and on Friday and Saturday the Company's Home Service Adviser gave cookery lectures and exhibitions.

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

Meters Tested by the Salford Corporation Gas Meter Testing Committee during the past year have totalled 28,043, the percentage of rejections being small—*i.e.*, wet meters, 1·32, and dry meters, 1·81.

New Plant, including an extension of the vertical retorts, which has been installed at Granton Gas-Works, was visited and inspected last week by the Public Utilities Committee of Edinburgh Town Council.

Speaking at a gas exhibition held in the Town Hall, Hawick, last week, Provost David Fisher maintained that the Gas Industry could not be accused of being a dying industry for it was marching with the times.

In Competition with electricity, the Jersey Gas Light Company have been successful in obtaining a new ten-year lighting contract for the parish of St. Martin—a district to which both gas and electricity were recently extended.

One of the Largest Exhibitions and cookery demonstrations ever held in Lincoln is now being held by the City Gas Department in the new Co-operative Hall. The Mayor (Councillor J. E. Fordham) declared the exhibition officially open.

Dividends for the current year have been declared by the Directors of Meters, Ltd., Manchester, at the following rates per annum: On the Preference Stock at the rate of 5½% and on the Ordinary Stock at the rate of 5%. Dividend warrants will be posted on Nov. 13, and the transfer books will be closed from Nov. 1 to Nov. 11, both days inclusive.

The Price of Gas for ordinary consumers has been reduced by the Kirkcudbright Town Council from 6s. 3d. to 5s. 5d. per 1,000 cu.ft. and for industrial consumers from 5s. 5d. to 5s. per 1,000 cu.ft. Users of chip ovens, bakers, pork butchers, &c., are in future to be treated as industrial consumers and all consumers will receive 10% rebate on gas used in excess of £25 worth each year.

The Complete Lower Floor at the recent Hastings Home Industries Exhibition was occupied by the exhibits of the Hastings and St. Leonards Gas Company and those of co-operating appliance makers. At various times during each day of the exhibition, demonstrations were given before large audiences. The exhibition was held at the well-known White Rock Pavilion, where concerts were given at intervals by the Hastings Municipal Orchestra.

In Fifty Years a well-known Halifax enterprise, Economic Stores, Ltd., has grown from a single small shop to embrace seventy-two branches and departments. One of the most successful departments is the bakery, where further extensions are being carried out to enable the output to be trebled. When completed it will be among the finest and most modern bakeries in the country. The ovens are fired by gas supplied by the Halifax Gas Department.

Cookery Lectures and Demonstrations by Miss Sybil Curd and an exhibition of gas appliances arranged by the Elland-cum-Greetland Gas Company last week were very well supported, over 1,700 people attending. Miss Johnson, M.I.H., M.I.D., of Electrolux Home Service Department, gave two cold cookery demonstrations and lectured on "Hygiene of Food Preservation." Miss Whitehead, of Messrs. W. H. Dean & Sons, Ltd., gave washing machine demonstrations.

An Excellent Gas Supplement appears in the *Architects' Journal* for Oct. 28. The descriptive matter, which is written by Mr. George Fairweather, A.R.I.B.A., is liberally illustrated with artistic pictures of all that is most modern in gas appliances. The object of the supplement is to provide information on the subject of gas mainly as applied to domestic heating and cooking. Readers of the "JOURNAL" may obtain copies from the publishers, The Architectural Press, 9, Queen Anne's Gate, Westminster, S.W. 1. Price 6d.

A Discussion in the *Western Mail* as to who is the oldest member of the South Wales Art Society reveals that, among the exhibitors at the Society's recent exhibition at Cardiff, was Mr. B. A. Lewis, who, at the age of 79, was showing six pictures. Many friends in the Gas Industry will recognize in this well-known painter the late Manager and Secretary of the Carmarthen Gas Company, who retired about eight years ago.

A Tribute to Gas Floodlighting appears in the *Hawick Express* for October 27. There is no doubt, runs an item in "Topics of the Town" columns, that the floodlighting of the Clock Tower adds considerably to the amenities of the High Street. The lighting, unobtrusively arranged, is ideally adequate to draw one's eyes to the impressive outline of the tower without proclaiming too loudly that this is its purpose. The installation was carried out by the Hawick Gas Company.

Members of The Institution of Gas Engineers are invited to attend a Meeting of the Institution of Civil Engineers, at Great George Street, London, S.W. 1, on Tuesday, Nov. 9, at 6 p.m., when a Paper on "Combustion Efficiencies of Gas and Oil Engines," by W. A. Tookey, M.Inst.C.E., will be presented and discussed. Advance proofs of the Paper may be obtained on application to the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

Gas Films were enjoyed in St. Andrew's Parish Room, Abbey Street, on Oct. 21, by 250 people, who assembled on the invitation of the East Hull Gas Company. Present were three Directors, Messrs. F. J. Gardam, Thomas Martin, and W. Hugh Stephenson, and officials of the Company. Introducing the films, Mr. Martin felt that the public service rendered by the Gas Light and Coke Company to the campaign for improving the health of the nation in producing the Nutrition Film should be specially acknowledged.

Application to the Ministry of Health is to be made by the Lakes Urban District Council for sanction to borrow £11,500, repayable over 30 years, for the purchase of new carbonizing plant. Subject to the approval of the consulting engineers and the Ministry, the tender of Messrs. Drakes, Ltd., Halifax, has been accepted. At a meeting of the Council it was stated that it was hoped to build the plant without causing an increase in the rates. A heavy loan on the old Undertaking would expire in 1943 and it could be expected that the profits on the Gas-Works would be sufficient to cover the new loan.

To Meet Capital Requirements occasioned by the continued expansion of their business the Directors of the Colonial Gas Association have decided to make a further issue of 62,136 8% preference shares of £1 each and 62,136 ordinary shares of £1 each. The price of issue for preference shares will be 23s. English currency and 28s. 9d. Australian currency and 20s. English currency and 25s. Australian currency for the ordinary shares. As nearly as possible six preference shares and six ordinary shares are being offered in respect of each 100 shares of the total holding of each shareholder. The Share Transfer Books will be closed to determine shareholders' rights at 2 p.m. on Nov. 9.

For Vertical Retorts, the Stockport Town Council has confirmed the acceptance of a tender amounting to £13,108, the contract to contain a clause for an increase or decrease in price in case of fluctuations in the cost of raw material or labour. Replying to the criticism that it would have been better to have got a firm price, Councillor Lord, the Vice-Chairman of the Gas Committee, pointed out in the special circumstances the clause was quite reasonable. During discussion it was stated there was a tendency for contractors to want to revise their terms after starting work. The Council had to distinguish between initial bargaining and an arrangement made on a schedule, and an alteration on that schedule when no other contractors could come in. The firm to whom it was proposed to grant the contract had a monopoly of a certain patent and if any other firm tendered they would have to sublet.

Amalgamation and Grouping

South-Eastern and Bexhill.

A meeting, convened by the Ratepayers' Association, the Commercial Society, the Hotels' Association, and the Labour Council, was recently held at Bexhill-on-Sea to discuss the offer made by the South-Eastern Gas Corporation for the purchase of the municipally-owned Gas Undertaking. The Gas Undertaking was purchased by the Borough of Bexhill about twelve years ago, together with the Water Undertaking. If the gas service is to be satisfactorily maintained, considerable expenditure on new plant will have to be met. A sum of £20,000 has been suggested as the purchase price. Eventually the following resolution was passed: "That this meeting does not approve of the transfer of the gas undertaking to the South-Eastern Gas Corporation." The question is to be referred to a professional accountant and considered by the Corporation's Finance Committee shortly.

South-Western and Wells.

Close Brothers, Ltd., Secretaries of South-Western Gas and Water Corporation, Ltd., announce that the Corporation has just completed the purchase of over 94% of the issued capital of the Wells Gas Light Company, including over 95% of the consolidated ordinary stock. Over 70% of the purchase consideration was satisfied by the allotment of preference and ordinary shares of the Corporation.

Tottenham and Southgate.

An extraordinary meeting at the Tottenham and District Gas Company on Oct. 28 approved an application to the Board of Trade for a Special Order to authorize the taking over of the Southgate and District Gas Company, the creation and issue of the requisite amount of stock for the purpose, and the adoption of a basic price in lieu of the present standard price authorized by the Tottenham Gas (Charges) Orders, 1921 and 1925.

The Southgate Company will be taken over on Jan. 1 next. The shareholders will receive, in return for each £100 7% stock, an equivalent of £140 in 5% stock, which will give them the same dividend.

G.L.C. Convalescent Home

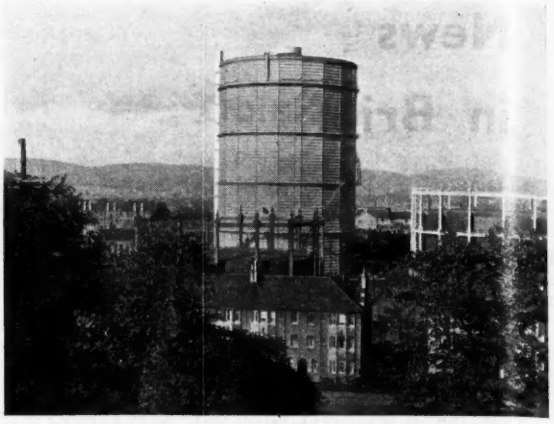
Large Numbers of Grants

In our reference on Oct. 20 to the new convalescent home of the Gas Light and Coke Company at Ramsgate, it was mentioned that 4,000 applications for treatment had been made and 3,000 grants in the past nine months. We are asked to state that the figures should have been 4,000 vouchers issued for hospital treatment and over 3,000 grants made for dental and optical treatment, &c.

Radiation Exhibit at North London Exhibition

A section of the fine Radiation exhibit at the recent North London Exhibition. A range of the Firm's latest productions included the Rotary New World cooker, the well-known New World Regulo-controlled cookers and ranges in coloured finishes as well as mottled enamel, selected examples of water heaters, High Beam fires, and gas-heated radiators. Cookery demonstrations were given by a Radiation demonstrator, and a most successful cake-baking competition was arranged. Excellent "murals" were a feature of this handsome stand.

Paisley's Waterless Gasholder



Our photograph shows the new waterless gasholder erected for the Paisley Gas Department by Robert Dempster & Sons, Ltd., the official inauguration of which was referred to in the "JOURNAL" last week.

Industry Very Much Alive at Hawick

Fine Display in Town Hall

Hawick Town Hall was brilliantly illuminated on Oct. 25 when, before a large gathering, the exhibition arranged by the Hawick Gas Company was formally opened by Councillor Mrs. Cunliffe. Mr. J. Boyd Sime, Chairman of the Company, presided and introduced Mrs. Cunliffe. Among others present were Provost Fisher, Mr. T. H. Armstrong, Mr. J. J. Oliver, and Mr. W. T. Grieve, all Directors of the Company.

Mrs. Cunliffe, who, after opening the exhibition, was presented with a beautiful bouquet by Master Ian Rorrison, contrasted the old-fashioned gas appliances with the beautiful models so well arranged about the hall—a contrast which enabled them to appreciate the value of such an exhibition. When she received the invitation to open the exhibition her attention was first drawn to the little booklet on nutrition, and she was so much impressed with the useful information it contained that she felt she must support the Hawick Gas Company in its efforts. The "Nutrition Film" would be shown several times during the exhibition, with all its invaluable information on how to keep the family fit for growth and work.

Provost Fisher said that a few years ago he was one of the great number who had begun to assume that the days of the Gas Industry were over and who took it for granted, with the coming of electricity, that the Industry was dying. Since he had been privileged to become a Director of the Gas Company and come more closely in contact with the Industry, he had had from time to time the very strongest reasons for altering his opinion. Provost Fisher concluded with a high tribute to the Engineer and Manager, Mr. Robert Cowie, and to Mr. Robert Cowie, Junr., and the staff for their work in arranging so magnificent an exhibition.

Carbonizing Results at Stalybridge

Six Months' Working of C.O.L. Plant

Interest attaches to the working results during April-September of this year of an installation of C.O.L. intermittent vertical chambers at the Stalybridge Gas-Works. The plant, which has been in operation nearly three years, consists of nine chambers having a capacity at full load of 850,000 cu.ft. per day of 500 B.Th.U. It is operated entirely by one man per shift.

During the period in question the load varied between 50% and 60% of maximum capacity and the average gaseous yield per ton when carbonizing South Yorkshire slacks and peas containing some 8% to 10% of ash and moisture amounted to 87·75 therms. Benzole was extracted to the extent of 1·33 gallons per ton of coal carbonized. If this be included, the thermal yield of gas *plus* benzole was 89·75 therms. If benzole had not been stripped from the gas, this would have permitted further steaming and would have resulted in the production of mixed coal gas and water gas amounting to 94·5 therms of 500 B.Th.U. gas per ton.

Since the plant was put to work no repairs of any kind have been necessary.

Gas-Works Modernization at Svendborg

From the October issue of West's Gas.

Svendborg's new gas-making unit . . . a Glover-West vertical retort installation of modern design, served by an automatic skip-hoist. Production began in this plant in the summer of 1936.

The Svendborg (Denmark) Gas-Works, built in 1856, had not altered much in appearance or method of operation until 1934, when complete modernization was finally decided upon. The old original direct-fired retort settings were still occasionally worked. In 1904-5 one bench of these was rebuilt on the half-generator system, and since then there had been no extension of the carbonizing plant.

Meanwhile the annual demand for gas, which in 1856 had been met by the manufacture of some 2¼ million cu.ft., had gradually increased to 25 millions by the year 1900 and 47 millions in 1919. After a temporary lull between that date and 1929 the demand again began to grow and this time so rapidly that the record total of 70 million cu.ft. was reached last year. It was not only the retort house, however, which had become quite inadequate to the advancing demand. The wet and dry purifying plant was similarly much below the requirements of good and safe practice.

It was, therefore, decided to proceed with the installation of modern carbonizing plant, new condensers, exhausters, purifiers, compressor, station meter, and district governor, with the necessary buildings and connections, and all this work had to be carried out and new plant installed, practically on the same site as the old, without interrupting the supply of gas to the town.

The new carbonizing plant, which was brought into operation in the summer of 1936, consists of eight Glover-West vertical retorts capable of a daily production of 14,720 m³ (520,000 cu.ft.) of gas of a calorific value of 4,700 K.Cal/m³ (528 B.Th.U./cu.ft.) from Durham coals brought to the harbour, adjacent to the Gas-Works, by steamer and discharged by barrows wheeled over ramps to the coal store. From the store the coal is elevated to the overhead bunkers in the retort house by a fully automatic skip hoist. The residual coke is discharged into skips which are elevated in an electrically operated lift to a gantry for transport to the coke-grading plant or to the producer stage and retort charging stage as required.

The coke-grading plant delivers four sizes of coke to a battery of reinforced concrete storage bunkers, below which are disposed coke-measuring apparatus and bagging plant with de-dusting screens.

Within the retort house surplus heat is recovered in an induced-draught horizontal fire-tube boiler. The steam raised in this boiler is sufficient not only for steaming the charge in the retorts and all other requirements of the retort house but for the operation of the exhauster, tar and liquor pumps, rotary-washer engine, and for steaming the gasholder cups in winter.

The retorts are housed in a building of a particularly pleasing design which blends well with the style of architecture prevalent in the town. One of the little touches of interesting detail is the use of green tiles for the roof covering to suit the background of green fields on the opposite side of the Sound. The new building for the auxiliary plant is also a very fine piece of industrial architecture, in which the Danish builder excels. The foundations for the heavier structures were supported by piles of a special design.

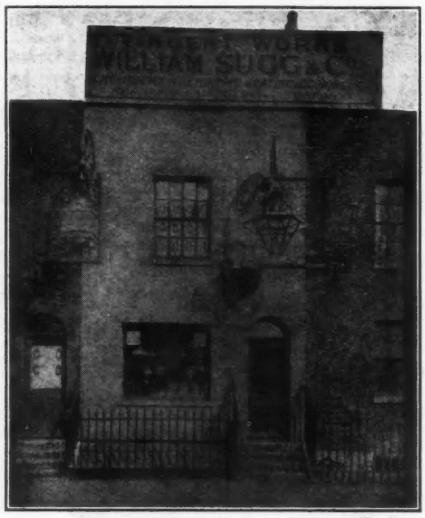
The reconstruction of the ancillary apparatus involved several minor feats of gas engineering. The building for housing the new apparatus had to be erected over the site of the old plant which had to be maintained in operation during the reconstruction. To achieve this the retort house was first completed and put into operation with the gas passing through a temporary main to the existing auxiliary plant. The first section of the auxiliary plant building was then erected and the new foul main completed as far as the new condensers and exhauster. The first half of the new purifier boxes was then erected and the main extended to them from the new exhauster. A temporary main from the second box was then connected through the existing meter. Just before this first section was put into operation, an existing tar extractor and washer-scrubber were taken out of commission and connected in the stream, after which the first section of the auxiliary plant was put to work. The existing Livesey washer was then taken down and, together with the naphthalene washer, thoroughly overhauled and re-erected in their new positions. The remainder of the old buildings was then demolished and the new building completed, during which the remaining two purifier boxes were installed and connected to the temporary main.

The third section of the scheme—viz., the erection of the new station meter and governor, was then commenced, and finally these were connected to the holder and the district respectively, after which the existing meter and a district governor were coupled to connections left for them in the new main.

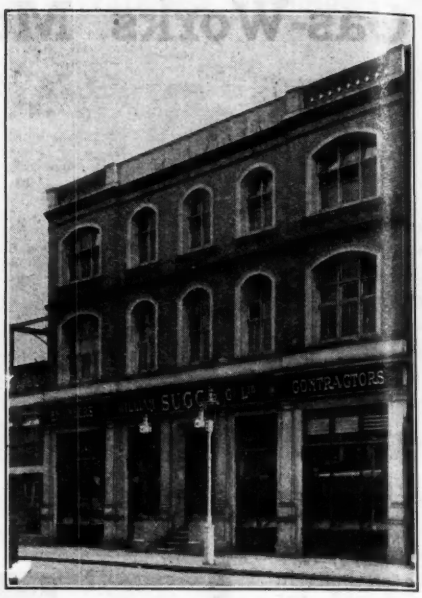
The new auxiliary plant, therefore, comprised two condensers of the water-cooled type with a total cooled surface of 300 sq.m., and one set of four purifier boxes with hoisting and transport arrangements for the removal of oxide, both supplied by Messrs. C. & W. Walker, a steam-driven exhauster by Messrs. George Waller, a station meter of Messrs. George Kent's shunt type capable of passing 850 m³ per hour, a self-loading station governor by Messrs. Peebles, and a steam-driven adjustable air compressor for the purifiers. The existing apparatus, including one exhauster, two gas meters, a governor, a P. & A. tar extractor, a rotary naphthalene washer, a similar ammonia washer, and a Livesey washer, were cleaned, repaired, and reinstated.

The reconstructed works has now been in operation for some months and already the results have entirely fulfilled all expectations. The Gas Committee and their Engineer, Mr. Anton Rasmussen, are to be congratulated upon a good piece of work, well conceived and admirably carried out.

The Centenary of the House of Sugg



Vincent Works, then—



—and now.

The business of William Sugg & Co., Ltd., was originally established in Marsham Street, Westminster, in 1837, and to commemorate the firm's centenary a Dinner was held last Friday at the Holborn Restaurant, which was attended by many distinguished representatives of the Gas Industry.

All the toasts were in capable hands, and many well-deserved tributes were paid to the prominent part the firm has played in the evolution of gas lighting throughout six reigns. Mr. C. M. CROFT (Chief Engineer and General Manager of the Wandsworth and District Gas Company) proposed "The House of Sugg," referring in particular to the considerable amount of gas street lighting in his area. "Our Guests" was proposed by Mr. ANTHONY A. SUGG (Director and Secretary), who referred with pleasure to the wide variety of trades and professions represented among their guests that evening. Responses were made by Mr. STEPHEN LACEY (Controller of Gas Sales to the Gas Light and Coke Company), Mr. R. J. ROGERS (Chairman of the S.B.G.I.), and Mr. H. C. SMITH (Engineer of the Tottenham and District Gas Company), all of whom paid tribute to the progress of the firm.

Early Days.

It was in 1837 that William Sugg entered into a partnership agreement with two of his contemporaries to carry on the trade and business of manufacturers of gas meters, brass founders, gas fitters, smiths, and engineers. On the death of the founder of the firm in 1858, the control of the business passed to his son, who had already devoted much attention and inventive genius to the improvement of burners for gas lighting. Such success attended his efforts that in 1866 it became necessary to provide a new factory, which was erected on a portion of the site on which now stands the present Vincent Works. The year 1869 must have been a triumphant one for the young engineer, William Sugg—who was then 37—for in that year his "London" argand burner was adopted by the Gas Referees as the Standard Test burner for the Metropolis, and their report concluded with the words, "This burner of Mr. Sugg's excels all others." Such an achievement spurred him on to further efforts in the sphere of photometrical work for the scientific recording of lighting performance, and the culmination of those efforts is to be seen in the very fine laboratory which forms part of the equipment of the house of Sugg to-day.

During the first great electrical lighting scare of 1879, Mr. Sugg rendered signal service to the Gas Industry by the introduction of improved burners for domestic use. These included many which had a world-wide reputation. Street lamps of improved types and greatly increased candle-power were also produced. In 1881 the undertak-

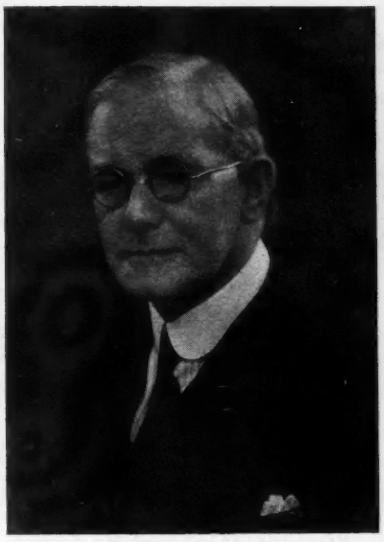
A Group of those present at the Centenary Dinner.

ing was converted into a limited liability company, of which Mr. Sugg was the first Managing Director—a position which he held until his death in 1907. The premises were enlarged in 1883 and extensively re-built five years later.

During the war the firm were controlled by the Ministry of Munitions, and its entire resources were applied to the manufacture of armaments—the great demand for which led to the acquisition of Ranelagh Works, Chapter Street, Westminster. On resumption of normal business after cessation of hostilities, the increased demands for the company's products necessitated the acquisition of a further works at Angel Road, Edmonton, and the erection of a large new building in the rear of the premises in Regency Street, Westminster. Since then the progress of the firm is common knowledge, and much credit for the present strong position of gas lighting, particularly in the streets, must go to those members of the firm who have done so much to develop units which for efficiency and economy are hard to excel.

On the heating and cooking sides, also, notable contributions have been made to the Industry, cookers having been manufactured as early as 1860. The long experience gained on the lighting side, however, has been embodied in the equipment provided in the firm's Photometrical Research Laboratory, which has been specially designed for the rapid and accurate testing of lighting units. The service of this laboratory, which ranks among the most modern and complete in the country, is always available for the use of Gas Engineers, together with the assistance of the technical staff, who are pleased at any time to co-operate in the preparation schemes.

We would join with the whole Gas Industry in congratulating the house of Sugg upon the completion of a hundred years of useful existence. Their history may surely be said to be synonymous with the development of gas lighting. May their next hundred years be equally profitable to the Industry they serve.

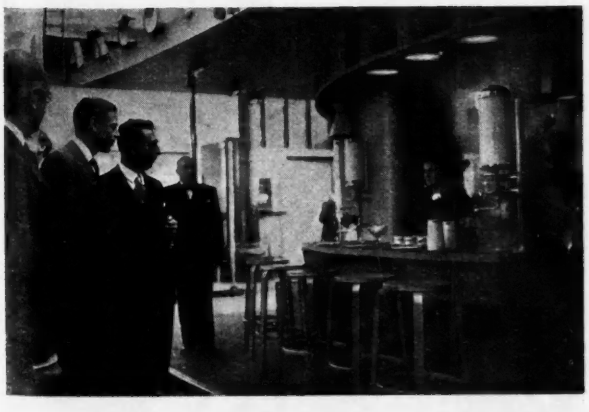


Mr. PHILIP H. SUGG,
Chairman and Joint Managing-Director.

The Duke of Kent at Ascot Exhibit

Architect Designed Stand

During a very busy tour of the North London Exhibition, H.R.H. the Duke of Kent inspected the exhibit of Ascot Gas Water Heaters, Ltd. The interest of His Royal Highness was certainly warranted, for the stand was specially designed by Mr. Rodney Thomas, A.R.I.B.A., and embodied many unique features. On the kind invitation of the Directors and Dr. Bernard Friedman, Managing Director, we were recently privileged to carry out a detailed inspection of the stand, and the following are particulars of its construction.



The lay-out of the design resulted from the position of the stand in relation to the entrance, the two screens facing in this direction. Also in view of the stand being open all round, the "Ascot" display was repeated, showing a complete range of appliances from two directions. The two tea bars were placed back to back so as to provide service to the public on both sides, with the central staff area having access for storage, &c., into the fins. Owing to the complication of the plumbing which always occurs, the fins were made wide enough for access, but tapered at either end to prevent a clumsy appearance. To create a contrast, the inside of each fin was carried out in corrugated asbestos, which made a very suitable display for the smaller circular type of heater. Other surfaces were carried out in "Dulux" rough finish, so as to give a contrast against the gloss surface of the "Ascots." In view of these rough surfaces, the sign-writing had to be dealt with in a special way, and this was achieved on circular glass discs fixed to appropriate positions. The position as a whole was approached from a stand fitting point of view, which is of a temporary nature, and although the bars are circular on plan, the supports and divisions were carried out on the straight, so as to avoid the extra expense in connection with circular work. The lighting was arranged so as to cast cross shadows on the corrugation and direct lighting on the "Ascots." Except for the corrugated asbestos, the stand is constructed of timber framing and ply wood, with the two supporting rods in chromium plating.

Two interesting new "Ascot" models—viz., the boiling water appliance and the bath water heater, were exhibited. These are described elsewhere in this issue.

British Commercial Gas Association

Northern District Conference at Darlington

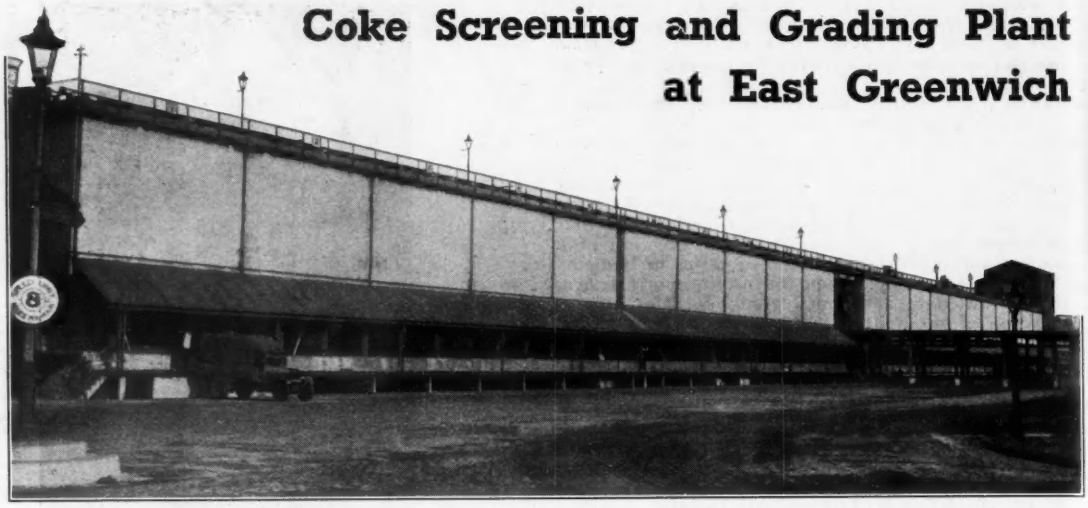
The Northern District Conference of the B.C.G.A. was held at Darlington on Oct. 27 in the Council Chamber of the Town Hall, the President of the Conference being Alderman Seaton Leng, J.P., Chairman of the Darlington Gas and Electricity Committee.

Following an Address by the Mayor of Darlington, Councillor R. Luck, at the morning session, Alderman Leng gave his Opening Address. A Paper was then read by Dr. G. C. M. M'Gonigle, D.Hy., B.S., D.P.H., Medical Officer of Health, Stockton-on-Tees, on "The Economics of Family Health," which was followed by a discussion.

The morning session over, the delegates were entertained at luncheon on the kind invitation of the Chairman and Members of the County Borough of Darlington Gas and Electricity Committee at the King's Head Hotel. After lunch, there was a visit to the Locomotive Works, by kind permission of the London and North-Eastern Railway Company, followed by tea in the Railway Institute.

At the women's session in the Bondgate Memorial Hall, where the chair was taken by the Mayoress, Mrs. R. Luck, Mrs. Eileen Murphy delivered an Address on "Men, Women, and Gas." Tea was preceded by a display of Interest and Educational Films.

Coke Screening and Grading Plant at East Greenwich

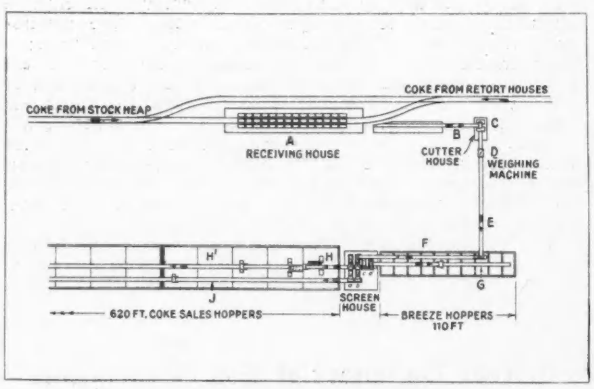


On Wednesday of last week Mr. Frank H. Jones, President of the South Metropolitan Gas Company, formally inaugurated a new coke handling and grading plant at the East Greenwich works. The scheme was prepared by the Engineering Staff of the South Metropolitan Company, and was carried out by West's Gas Improvement Company, Ltd.

The plant has been designed to receive coke either directly from the retort house or from the stock heap, and to cut, weigh, grade, and store in sales hoppers at a nominal rate of 100 tons/hour.

The receiving house (A in the plan we reproduce), containing a long receiving hopper at ground level, is situated on a rail-track joining the retort houses and the stock heap. Coke trains arriving from either direction may discharge without delay into the hopper, which has a capacity in excess of two train loads, and return by the loop line provided.

Bottom discharge from the hopper is effected by means of a long roll-feeder, which delivers on to a 30 in. band-



Diagrammatic Sketch of the New Plant.

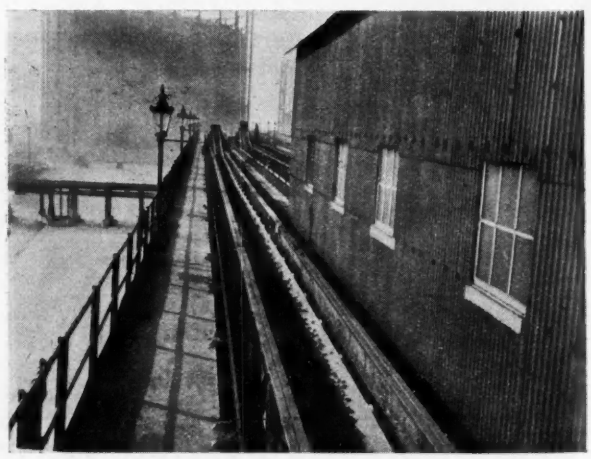
conveyor (B). The hopper outlets are provided with finger gates separately controlled by means of robust screw-gear and fitted with large diameter hand-wheels, so that control of the rate of feed is both light and accurate. A series of coloured lamps indicating the rate of feed in tons per hour is provided in full view of the gate attendant to enable him to maintain a steady feed at any desired rate.

Conveyor (B) rises at the head end to the cutter house (C), which is placed at ground level for convenience of replacement of cutter knives, &c. Two Corts cutters, each capable of handling the full capacity, are arranged with a central by-pass chute, either cutter being brought into use as required. The feed chutes are designed to spread the coke evenly over the full length of the knives. From the cutter house the 30 in. band conveyor (E) rises uniformly at 18°, and a section of this conveyor forms the weigh length of the automatic and continuous weighing machine. Here the weight of coke is recorded on a clock mechanism, readings being noted daily or as required. The head of this conveyor is located on the breeze storage hoppers, which serve also to support the lower end of the 30 in. band conveyor (F), fed at right angles from conveyor (E). Conveyor (F) also rises uniformly at 18° to the screen house, where it discharges to the appropriate screens.

The screen house is a separate structure placed between the coke sales hoppers and the breeze hoppers, and contains two pairs of Corts screening conveyors of the latest type incorporating the Drigenko balanced drive. The double deck screens (*a*) and (*b*) are brought into use for grading, the single deck screens (*c*) and (*d*) being merely debreezing screens for the uncut and ungraded coke. Each pair consists of two 50 tons per hour screens in parallel, this arrangement being more satisfactory than a single 100 tons per hour screen.

When dealing with uncut coke the debreezing screens (*c*) and (*d*) deliver screened coke to the 30 in. conveyor (H) and thence to the 30 in. conveyor (H_1), later described. The breeze passes to the 18 in. band conveyor (G), which discharges into the breeze storage hoppers by means of a travelling tripper with double discharge. The breeze hoppers have a capacity of 400 tons with bottom discharge direct to rail trucks.

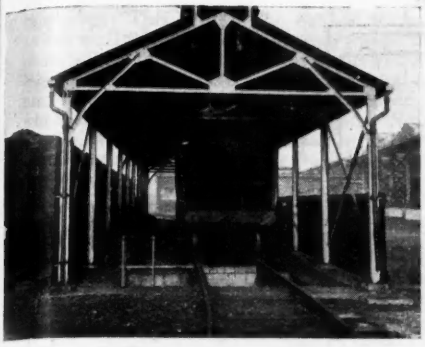
When cut and graded coke is required all material passes over the screens (*a*) and (*b*), which first extract all coke over $1\frac{1}{8}$ in., and deliver this to conveyor (H). From the residue they then extract the boiler nuts ($1\frac{1}{8}$ in.-$\frac{1}{2}$ in.) and



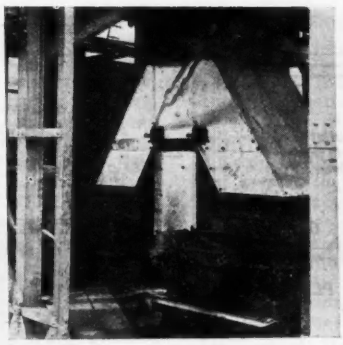
The Two Conveyors Running Parallel with the Sales Hoppers.

deliver this grade to the 24 in. conveyor (J). The breeze is delivered to the 18 in. conveyor (G) as in the case of screens (*c*) and (*d*).

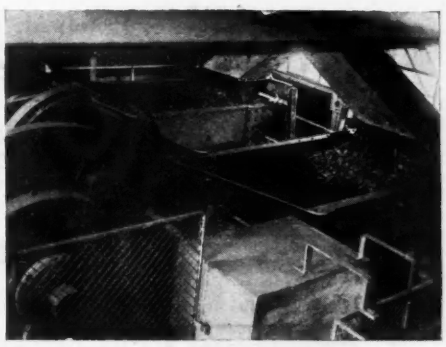
Conveyor (H), carrying all coke above $1\frac{1}{8}$ in., delivers to two further single deck screens (*e*) and (*f*) also arranged in parallel. These screens extract the medium grade (over $1\frac{3}{4}$ in.) and deliver this direct to sales hoppers having a capacity of 400 tons. The residue, which now consists entirely of large nuts, ($1\frac{3}{4}$ in.-$1\frac{1}{8}$ in.) is delivered to conveyor



Receiving House and Hopper.



Cutters.



Screens.

(H_1). Thus conveyor (H_1) may carry ungraded but debreezed coke when screens (*c*) and (*d*) are in operation, or large nuts when screens (*a*) and (*b*) are in operation. A self-propelled tripper is provided for discharge to either side into the appropriate sales hopper.

The 24 in. conveyor (J) running parallel with (H_1) carries only the small nuts ($1\frac{1}{8}$ in.-$\frac{1}{2}$ in.) and has a similar tripper with one side discharge only. These two conveyors extend the whole length of the sales hoppers, which have a total capacity of 4,200 tons coke, with facilities for rail or road loading throughout their length.

The belts are each approximately 1,300 ft. long and are vulcanized endless. The tension gears occur at a gap in the hoppers at approximately half distance, and are of the gravity type. In each case the drive is at the tail end, all drives being concentrated at the screen house.

The plant deals adequately with a daily (24 hours) load of 2,000 tons, cut, weighed, graded, and stored ready for immediate sale. A final debreezing of all grades takes place at the hopper outlets by means of static screens, ensuring a clean and uniform product for the consumer.

Maintenance costs are expected to be kept down to a low level, features contributing to this being the galvanizing of all structural work, the use of Cellactite sheeting, and the employment of ball bearings throughout.

The scheme was prepared by the Engineering Staff of the South Metropolitan Gas Company, and carried out by Messrs. West's Gas Improvement Company, Ltd.

Non-Aerated Flames in Gas-Ovens

AND

Improvements in Oven Design

BY

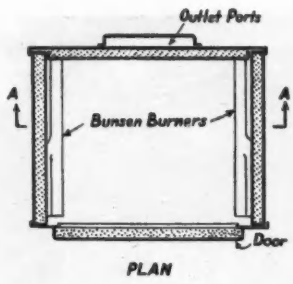
DEAN CHANDLER,
of the South Metropolitan Gas Company.

Which is more suitable for heating the enclosed space of a gas oven—the non-aerated or the Bunsen flame? This may be thought to have been settled long ago, for it has been a common practice for years to use the Bunsen flame, and to raise this question now may be considered unnecessary and even futile. The Writer has, however, long held the view that the last word has not been said on this important question and the time has come when the relative merits of the two methods of burning gas for the purpose of heating ovens should be reconsidered and experimentally investigated by the Gas Industry.

The operations which are carried out in a gas oven are relatively low-temperature processes and the temperature of the flame has, within limits, of course, little bearing upon the problem. Meat and the other items of a meal requiring preparation have to be cooked only, not cremated. It appears, therefore, that there is no logical basis to support the theory that it is necessary to use the Bunsen type of burner to ensure satisfactory cooking results. Logic, if logic there be, indicates that the simplest and the least complicated device should be employed for the purpose of heating an oven, since there is no special virtue in the aerated flame to justify its rigid adoption. The advantages of the non-atmospheric flame are obvious. The absence of adjusting devices and the elimination of the tendency to back fire on closing the oven door, more especially when the flame is reduced to small dimensions for low temperatures in the oven, are factors of the greatest importance. The non-aerated flame can be effectively adjusted, by turning the tap, to a smaller consumption than is the case with the Bunsen type of flame. Moreover, there is no injector to be covered with dust. Just why the Gas Industry deserted the old love—originally flat flame burners were used—and took on the new is difficult to explain. The pioneers of cooking by gas—James Sharpe, of Southampton, William King, of Liverpool, and Ebenezer Goddard, of Ipswich—always used non-aerated flames, and according to William Sugg, himself an advocate of this type of flame, the celebrated chef, Alexis Soyer, roasted a bullock whole at South Kensington by "luminous gas." The probable explanation is that in the early days, when the flat flame was used for producing light, gas burners were designed to produce the maximum lighting effect by the limitation of the access of air to the flame. Such burners were therefore inclined to smoke in confined and restricted spaces. But nowadays non-aerated flame burners designed for purposes other than light production are available which give a rigid type flame with combustion characteristics approaching those of the non-luminous burner. A somewhat analogous condition of affairs has arisen in the motor car industry. Originally all motor car engines used coil ignition. The coil was succeeded by the magneto, and engines became magneto-fired. With modern development in coil ignition, the trade is returning to its first choice.

Marie Jenny Sugg, in her book on "The Art of Cooking by Gas," published in 1890, states that "The principal kinds of apparatus in use at the present time for cooking by gas can be divided into two classes—viz., (1) those in which the gas flames are of a luminous type (that is to say, are similar to the burners used for lighting rooms, but on a smaller scale); and (2) those fitted with burners generally called 'atmospheric flames,' in which the gas is largely diluted with air before being burnt. The products of combustion from self-luminous flames are only steam and carbonic acid, and are no more hurtful than the products from good gas-burners used in lighting rooms. Moreover, the taste of the meat cooked in ovens heated by blue flames is not so good as that of meat roasted by the radiant heat of white flames. (*Vide* the 'Report of the Jury of the Crystal Palace Gas and Electric Exhibition, 1883,' who based their opinions on a series of exhaustive trials, and testified to the superiority of the meat cooked by the white flames over that cooked by the blue ones). The original inventors of cooking by gas used only self-luminous flames. Mrs. Clarke, the lady superintendent of the National Training School of Cookery, after careful and extended trials at South Kensington (where the school was started), has finally adopted white luminous flames for the new school in Buckingham Palace Road."

These expressions of opinion by experts in the cooking art, taken in conjunction with recent developments in



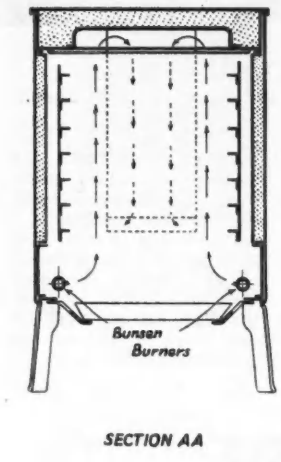
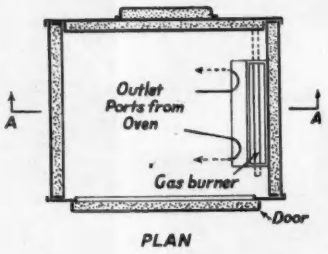


Fig. 1.



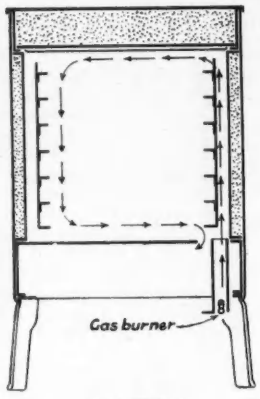
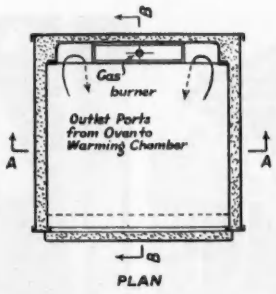
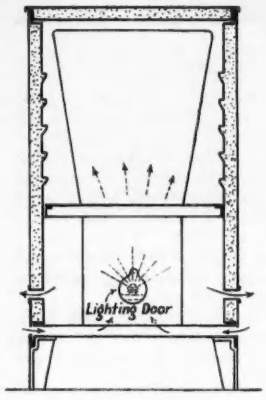


Fig. 2.





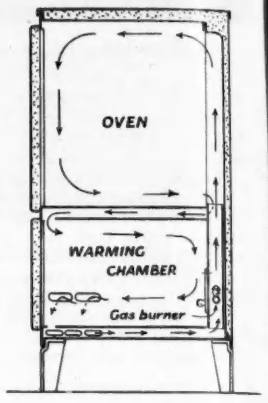


Fig. 3.

the design and construction of non-aerated burners, suggested that this question of atmospheric *versus* non-aerated burners for cooking in gas heated ovens merited further investigation. This has now been done over a period of about six months. The results indicate the superiority of non-aerated gas flames over Bunsen flames for purposes of cooking in gas heated ovens. The tests were carried out *seriatim* as follows:

Comparative Tests.

For the initial experiments, comparative tests were made in a well-known type of cooker, with one gas burner and bottom flue outlet, before and after its conversion to heating by non-aerated flames. The items of a reasonable dinner, much loved by John Citizen, roast beef and Yorkshire, roast potatoes, with rice pudding and gooseberry pie to follow, were cooked in each oven in turn. The professional cook who cooked the meal, John Citizen and his three friends who saw and tasted the results, all expressed themselves in favour of the meal cooked in the oven with non-aerated burners. This experience has been amply confirmed by about three months' experience of everyday domestic cooking in the same well-known type of cooker fitted with non-aerated burners. The cooker was installed in the house of a gas consumer, the household of which included a housewife, fond of cooking, but without any professional qualifications as a cook, and at least one member trained in the ways of science and accustomed to assess without bias or prejudice, as far as is humanly possible, the results of scientific experiments. This household has unequivocally convinced itself that the cooking of pastry and cakes in the oven fitted with a burner having non-aerated flames leaves nothing to be desired. "Pastry and cakes," they say, "cooked in such an oven are markedly better in appearance and in taste than pastry and cakes cooked in any other oven of which we have had experience. Meats cooked in this oven seem, to some of us at least, to be of rather better flavour than when cooked in other ovens." This experience is confirmed by results obtained in another household. So much then for experience with the non-aerated burner cooker in everyday use.

Further tests in the laboratory were considered desirable. In these the co-operation of the makers of the cooking stove in question was sought and willingly given. A series of comparative cooking tests was drawn up by one of the cooking experts attached to the laboratories of the firm, and it was arranged that the products of cooking in the ovens fitted respectively with non-aerated and atmospheric burners should be set out under code numbers to be retained by the cooking expert. These products included shortbread, queen cakes, scones, Genoa cakes, meringues, and what is described in the official Report of the tests as Menu 2. The products were inspected and sampled by the technical chief attached to the firm in question and by the Writer of this note.

Saving in Gas.

Taking the results as a whole, the cooker provided with non-aerated flames was found to be quite equal to that having aerated flames, so far as quality of the cooked product was concerned. Moreover, there was a saving of from 3 to 20% in the gas used in the individual tests for cooking, in favour of the non-aerated burners.

Other types of gas cookers have been converted to the use of non-aerated flames, and when the position of the burner has been correctly determined no difficulty has been experienced in cooking satisfactorily all kinds of food.

The work so far carried out on the application of non-aerated burners to gas cookers has indicated the possibility of improvement in their design and construction.

Fig. 1 illustrates the standard pattern 2-burner gas cooker with Bunsen burners.

Fig. 2 shows the cooker of fig. 1 modified with a non-aerated burner. The cooking space is the same as that in fig. 1.

Fig. 3 is a form of construction which is the result of the experience gained from the experiments so far carried out. An oven built on these lines has proved quite satisfactory in use. Here the cooking space is again exactly the same as that in fig. 1, but it will be noticed that the external dimensions of the oven are appreciably less than those of the first cooker. Then, too, the waste space below the effective cooking space in figs. 1 and 2 has been utilized in the new design for a warming chamber. The new design, therefore, gives the same useful capacity with reduced overall oven size. The combustion chamber housing the non-aerated burners may be situated either at the back or the side of the oven. The hot air circulated through the oven is directed in its passage into a second chamber through ports in the oven floor. By these means the latter is effectively heated. In the lower chamber milk puddings and fruit can be satisfactorily cooked and dishes and plates sufficiently heated.

The photograph is of a sheet metal cooker of light construction without lagging as it is generally understood. The oven is heated by non-aerated flames which are housed in a special combustion chamber at the back of the oven. The outlets for the products are provided in the sides of

the oven. This allows the cooker to be placed close up to the wall with economy of floor space. A plate-warming chamber of ample proportions is provided above the roasting chamber. A plate rack of the usual type is, therefore, unnecessary. A hinged enamelled cover forms a table top when the cooker is not being used. Non-aerated burners can be fitted with a pilot flame and bi-metal safety device.

It is perhaps not inappropriate to point out that there

Cooker with Non-aerated Oven Burners and Warming Chamber.

does not appear to be any fundamental reason to justify the heavy construction which characterizes many gas cookers of to-day. Equally satisfactory cooking results can be achieved in ovens made of comparatively thin sheet metal. As stated, the sheet metal stove illustrated is unlagged, as lagging is generally understood. This oven has proved almost as economical in the use of gas as many standard gas cookers which are available to-day. It may be thought that the outer casing of an unlagged gas cooker must get unpleasantly hot. This by no means necessarily follows. It depends entirely upon the design and construction of the stove. The use of oil heated stoves in all parts of the world—most of them are not lagged—is evidence in support of this view. It may be said that lagging is not so important when oil is the fuel, but when gas is used lagging is most essential to the economical use of gas. Practical experience, however, has demonstrated that a properly designed unlagged gas-heated oven can be efficient. It is to be noted that the use of thin aluminium plates or aluminium foil is of considerable value for conserving heat.

A few words in regard to large-scale cooking using non-aerated flames. For over three months a large gas oven, fitted with non-aerated burners, has been in daily use, cooking all classes of food for about 100 persons. Its performance to-day is as satisfactory as on the day it was converted from Bunsen to non-aerated flames; in the meantime the oven and burners have not required any attention other than that ordinarily given to cleaning. The non-aerated burners have given perfect satisfaction as to actual combustion of gas and the quality of the cooked products.

A case for the use of non-aerated burners has, I think, been made out by these tests; the matter is now one for the attention of the Gas Industry and the makers of gas cookers.

And now, finally, the view may be held that the application of non-aerated flames to gas ovens does not merit serious consideration. That bias is strong in favour of the now well-established Bunsen burner is probably true, but the fact must not be overlooked that there is no scientific basis for the exclusion of the simpler and more direct method of burning the gas.

Compared with the gas that was made in days gone by when non-aerated flames were almost exclusively used the gas now distributed to our cities and towns has low intrinsic self-luminous quality, a factor which favours the use of non-aerated flames. Gas engineers and gas appliance makers would do well to have this constantly in mind and take full advantage of it. To be able to regulate by a tap the amount of gas from the potential maximum for which the burner is designed to a flame of pin-point proportions with the ease and safety that is possible with non-aerated flame burners is a valuable asset to the Gas Industry.

A note of warning is necessary. A few flat flame burners taken at random and applied to gas ovens without adequate preliminary experimental investigation to determine the right type of flame and the disposition of the burners in relation to the oven will probably lead to the condemnation of the non-luminous flame. Experience has shown that careful research to ascertain the essential conditions for the successful application of non-aerated flames will be justified by the result.

London and Counties Coke Association

The Sixth Annual Meeting of the London and Counties Coke Association was held at the May Fair Hotel, W. 1, on Monday of last week—the CHAIRMAN (Mr. R. W. Foot) presiding.

The CHAIRMAN, having dealt in some detail with the accounts, said: At our General Meeting last year you will remember that we passed two very important resolutions: (1) That we should recommend to our members that as from July 1 last they should sign Agreements of Membership of the Association for a further period of five years, and (2) That the Central Committee should be given authority to increase the subscription up to a maximum of 2d. per ton. I am very glad to be able to report that all members have agreed to the extension of the Agreement for the further period of five years and also to the increase in the subscription—a clear indication that the value of the Association to its members is well recognized.

We have obtained seven additional members during the year, all of them, of course, on the five years' basis and all these we are very glad to have within our ranks. I am glad to say that our membership now includes over 99% of all the coke produced for sale in the area.

The tonnage of coke produced for sale by the members of the Association during the year 1936-37 reached the large total of 3,320,706 tons, or over 400,000 tons more than in the previous year, and members will be interested to know that whereas in the year when the Association was formed the production of coke for sale was 2,534,000, it has now increased by very nearly 800,000 tons. These are very striking figures.

Coke Distributors' Branch.

During the year the organization of the Coke Distributors' Branch has been finally and successfully completed. The membership is now over 3,500 and includes practically everyone who is concerned with the distribution of coke in our area. I am glad to say that the year's working with the Coke Distributors' Branch has established beyond all question its value both to the producers and to the distributors.

With regard to the arrangements with the National Association of Heating, Ventilating, and Domestic Engineering Employers, I referred in my 1935 review to the understanding which we had come to with the representative body of the heating engineers for mutual co-operation. This arrangement has worked well, although within a rather limited field, during the last two years. We have, as you know, established a Joint Committee with the heating engineers which meets from time to time, and at one of these meetings the suggestion which has always been present in our minds—that the Agreement which had operated successfully with regard to coke might be extended with advantage to gas—was considered. The Central Committee feel satisfied that it would be to the mutual benefit of the gas undertakings and of the heating engineers to extend the arrangement to gas, although, as is obvious, we are established as an Association to deal with coke and coke alone. Heads of Agreement have, therefore, been settled with the National Association of Heating,

Ventilating, and Domestic Engineering Employers for a joint arrangement with regard to gas and coke.

I very much hope that so far as our members are concerned our list will be a 100% one, as I am convinced there is a great business advantage for all of us in working and co-operating on these friendly lines with the profession of heating engineers.

Price Fixing.

The work of the Price Fixing Committees, the settlement and printing of the schedules, and all the important but very detailed work in connection with our price control proceeded this year very smoothly. A great deal of work, as you no doubt realize, is entailed, and the staff are very ably aided by the various County Committees, the County Advisers, and the London Advisers.

The Technical Staff have been busy throughout the year, and new development work has been of an important character in two directions—(1) Grass-Drying; (2) Fog-Lifting.

I should like to take this opportunity of enlarging upon this development, because of the importance which grass-drying has already attained in agriculture, and its value to us as a coke-consuming process. In 1935 there were less than a dozen grass-drying installations in Great Britain; by the end of 1936 there were 46 installations, and at the present time the number has reached 100 plants. Further, only one type of machine for this process could be purchased in 1935, whereas six different makes were available by the end of 1936.

The cost of fuel plays a large part in the total costs of dried grass production, and it was the purpose of the Association to see that this market was developed properly for coke utilization, and to ensure that the consumer had the best possible appliances to enable him to obtain the maximum heat from the coke he used. As a comparative figure, I might add that the furnaces which were installed with the first grass-drying plants had an efficiency of 30%, whereas the semi-producer furnaces developed by the Association, which incidentally are much easier to operate, have an efficiency of 86%. From observations made during the present year from grass-drying plants having an average output of 4 cwt. of dried product per hour, the cost of production, inclusive of all charges, averages £4 15s. 8d. per ton. Of this, the fuel cost is about 18s. 10d. The cost of imported artificial feeding stuffs which would have the same equivalent feeding value would exceed £8 per ton, so that from the economic aspect grass-drying seems to be a sound proposition for the farmers of this country.

A great deal of information on grass-drying from the point of view of food value was given in the booklet which the Association issued on this subject a year ago, and this publication is perhaps typical of the wide understanding and detailed investigations which are necessary in development work of this character. Not only is it necessary to design appliances or furnaces for the best utilization of our fuel, but the understanding which we have accumulated of the complete process of grass-drying has enabled our technical officers to give material assistance in the actual design of the grass-drying machines themselves.

You will have noted from the Annual Report in your possession the reference which has been made to the possibilities of using coke as a heating medium for the purpose of lifting fog from aerodromes. Preliminary designs for the practical application of heat generating units for this purpose have been actually submitted to the airport authorities, who are satisfied that the application of heat in the manner proposed would be sufficiently effective to lift fog 50 ft. from the ground and enable the safe landing of aeroplanes.

Approved Appliances.

A very important part of the Technical Committee's work has been taken up with the consideration, testing, and approval of appliances for the more effective utilization of coke.

The Association has spent a considerable amount of money in testing not only new appliances which are proposed for development, but appliances which are commonly used and may have been on the market for some time. The result of all this work is beginning to show itself in a better type of equipment for coke usage, and the elimination of apparatus which is not calculated to give the optimum of good results to our consumers.

The Association is to issue shortly an Approved List—I might properly call it a catalogue—which will detail all the appliances for coke usage which have been tested and approved up to date. This catalogue will include apparatus for almost every known application in which coke can be used, so that our members may use or recommend any one of these appliances with confidence in its efficient operation.

Technical Service.

The technical work of the Association, beyond that which I have reviewed, has its major function in the direct assistance given to members, and I am glad to be able to report that the services of our technical officers are being called for each year to an increasing extent.

The new Standard Form of Contract between producers and distributors has been settled between the Central Committee of the Association and the Central Committee of the Distributors' Branch. During the year it has been circulated to members, and it is hoped that it will be generally used as the standard form.

The Technical Committee, under the Chairmanship of Mr. H. C. Smith, has done excellent work throughout the year and is a vital part of our organization, as also is the Finance Committee which, under the Chairmanship of Mr. S. E. Knowles, has met monthly throughout the year, and it is very largely the result of their work that I am able to report that the accounting methods and the finances of the Association generally have never been in such good order.

The Advertising Committee, under the Chairmanship of Mr. W. J. Sandeman, have naturally not been as active as they would like to be, as they have very little money to spend on propaganda work and none at all on Press advertising. They have, however, been of considerable assistance in connection with the preparation of the various brochures, and we are grateful to them for the work which they have put in.

The two Management Committees of the Association are, as you know, the Executive and the Central Committee, and as Chairman of both these Committees I can perhaps speak with some authority with regard to the work which has been accomplished.

It has been a busy year in every direction, both in the office and outside, and members of the Association can feel satisfied that they have a staff which is not only efficient for all the work it is called upon to perform, but also brings to that work a real spirit of goodwill and enthusiasm.

International Cartel.

I would like to make a very few remarks on one or two matters of wider interest in connection with the organized selling of coke. In the first place, during the year an International Coke Cartel has been established for the regulation of the export market in coke throughout Europe. The Countries which are members of this Cartel are Germany, Holland, Belgium, Poland, and Great Britain. As you know, the export market is a matter of some considerable importance to the Gas Industry, the export of gas coke totalling to nearly one million tons during the year. We have, therefore, co-operated in the completion of the arrangements for the International Cartel and the formation of an Association called the Gas Coke Export Association.

At the request of the Export Association, and with the approval of your Central Committee, our General Secretary is acting as Secretary of the new Association, and the machinery of our office organization has been placed at its disposal. There is a Central Committee established to control the British interests in the International Cartel, and upon this Committee the Gas Coke Export Association has seven members representative of all the districts concerned in the export of gas coke.

With the serious increase which we are being called upon to pay at the present time for our coal the maintenance of our coke markets at a proper level has never been more important to the Gas Industry, and while the present position is that the demand for coke is in excess of the supply, there is no doubt that we shall see within the next few years that position reversed, and unless in the meantime throughout the country generally arrangements can be made for the proper control of the coke market the position may be very serious.

The CHAIRMAN then moved the resolution for the adoption of the annual report and accounts, which was seconded by Mr. G. A. MALLETT (Ipswich) and carried unanimously.

The CHAIRMAN said that Dr. Carpenter, who had been President of the Association since its inception, had intimated that he could no longer fulfil this position. They owed him a great debt of gratitude, said Mr. Foot, and he would like to propose their sincere thanks for all he had done for them. He had approached Mr. Frank H. Jones,

and he had consented to succeed Dr. Carpenter as President. Mr. Jones had also been a great supporter of the Association since its inception.

Mr. W. PHILLIPS (Luton) seconded the expression of thanks to Dr. Carpenter, which was carried unanimously, and thereafter Mr. Frank Jones was elected President on the proposition of the CHAIRMAN, seconded by Mr. W. W. TOWNSEND (Colchester).

After the General Secretary had reported the composition of the various district representations for the year 1937-38, the Association's Auditors (Messrs. Cash, Stone, & Co.) were re-appointed; and the meeting then terminated.

The Sixth Annual Luncheon.

Prior to the General Meeting, the Sixth Annual Luncheon of the Association was held at the May Fair Hotel—Mr. R. W. FOOT presiding.

The Loyal Toast having been duly honoured,

Mr. HENRY WOODALL, J.P., M.Inst.C.E., proposed the toast of "The London and Counties Coke Association." It was, he said, a great pleasure to him to be there that day and to see so many old friends. He noted that this was the Sixth Annual Luncheon of the Association, and he also understood that on no previous occasion had the health of the Association been proposed. It was not, perhaps, unfitting that he should now be proposing that toast because he had had something to do with the inception of the Association and he had always admired its work and had been one of its most loyal supporters. At the time the Association was started he had told Mr. Foot that he hoped price would not be the only consideration. Many prosperous businesses had been ruined as a result of a high charge to the consumer that, in the face of competition, had often resulted in disaster. But no such criticism as this could be levelled at the L.C.C.A. It was not, however, until the Association was started that he realized its great possibilities.

To-day, continued Mr. Woodall, the consumer was getting a better article, while the producers and distributors were getting a better price. The final result had been the elimination of cut-throat competition and the supply of coke of good quality by the members of the Association. And although the consumers might be paying a little more for it, they were getting an article which was worth the money. The results which had been realized were such that he felt the Association might well congratulate itself on what it had done. He imagined that the Association had done more in a very short time to improve the coke position of gas undertakings than probably any other body they had known. It had taught them a lesson, which he hoped they would not forget, in bringing them all together, and he would very much like to see some other commodities treated on more or less similar lines.

Mr. R. W. FOOT, responding, said they greatly appreciated that it should have been Mr. Woodall who was the first to propose the toast of the Association. They had had a very large number of kind friends, not only in the Association but behind it. They had done their very best to get the Association going, but they could have done very little, however energetic they had been, unless they had the backing of the chief executives of the gas undertakings within their area. They had the great support of Dr. Charles Carpenter, and it was a matter for regret that they were no longer able to have a continuance of that support. They had had the support of Sir David Milne-Watson, of Mr. Woodall, of Mr. Frank Jones, of Mr. R. W. Edwards—all great names in the Gas Industry of the South of England; and they should not accept any of the compliments they had just heard without acknowledging the help of the chairmen of gas undertakings, without which they could not have started. Therefore they appreciated that Mr. Woodall had come there that day to pat them on the back.

Three Main Objects.

The Association was founded with three main objects, said Mr. Foot. Price control, as Mr. Woodall had reminded them, did not become merely a price ring which would have jeopardized the interests of the consumer. So the first essential was to establish a really equitable price control, with the object of keeping the price up when it should be kept up or, as had been evidenced during the past twelve months, of keeping it down. If they had not had control during the last few months prices would have run up to all sorts of silly figures. That was the answer to all their critics. That was their first objective; but they realized that this was not sufficient in itself. There were two other aspects. One of these was active selling, in which connection he acknowledged the work done by the technical staff, largely as a result of which the reputation of gas coke stood higher to-day than ever before. The third aspect was co-operation with the various distributors of coke. Previously there had been a certain amount of suspicion on the part of the distributors; but they trusted the Association and came into partnership with them, with the result that they had now established as an integral part of the Association no fewer than 3,550 distributors—all active members of the Distributors' Branch; all partners in the business of distributing coke to the millions of customers in the South of England. Those were the three main objects of the Association, and they had, to a large extent, been achieved.

In conclusion, Mr. Foot said they were delighted to have all their guests with them that day, and they wanted to thank Mr. Woodall once again for the kind way in which he proposed their toast; they would endeavour to live up to those things he had said about them. Mr. Foot then gave them the toast of "Our Guests," coupled with the names of Mr. H. C. Smith and Mr. John Charrington.

Mr. H. C. SMITH said it gave him great pleasure to be there and to reply to this toast as representing The Institution of Gas Engineers, which had, for years, appreciated the importance of coke. Mr. Foot had mentioned the co-operation between the Association and the Distributors' Branch, the Coal Factors' Association, the Heating and Ventilating Engineers, and other bodies, and without that complete co-operation the Association could never have been the success it was. They had, indeed, attained a very large measure of success in the South, and he did not think the difficulties which would be met in other parts of the country would be greater. He was quite sure that if other districts tried to set up coke associations on the lines of the L.C.C.A. they would not meet with complete success unless they set up offices and installed a competent staff to deal with coke—a staff whose sole job, so far as its business life was concerned, was to further the interests of coke. It would be no use trying to do it by appointing one member as Hon. Secretary; there must be a separate staff, just as the London and Counties Association had. Mr. Smith thanked the Chairman for the very kind things he had said in regard to him, which he appreciated very much indeed. They owed their Chairman a very great debt of gratitude for the work he had put into their Association, and the whole of the Gas Industry should be extremely grateful to him. The best way they could show that gratitude was by following the lead of the London and Counties Coke Association.

Mr. JOHN CHARRINGTON, also responding to the toast, acknowledged the kind things that had been said about the Coke Distributors' Branch. He also felt he was hardly a guest, for he had been one of the keenest supporters of the Association. Controlled selling appealed to him, and it was a great thing to feel that they had a fixed price which showed a reasonable return, while at the same time they were able to give their customers a good standard of service—which was the best way of selling a commodity. It had proved itself an abundant success in the case of coke.

Mr. E. V. EVANS, proposing the toast of "The Chairman," said it was difficult for him to add anything to the gracious things which had already been said about their Chairman. Nevertheless, there was no gainsaying the fact that Mr. Foot was the vital principle of that Association. That year had seen the inception of a coke export association, and he had been at the back of that; and now they were giving consideration to national bodies for the organization of coke selling and technical research. He was afraid Mr. Foot was going to have a good deal of work in these matters, because the country could do no better than follow the lines on which their Association had been built and developed. He thanked their Chairman sincerely for another year's work and were deeply indebted to him for his excellent services to the Association.

Mr. FOOT, in response, said he greatly appreciated, particularly as it came from the General Manager of the South Metropolitan Gas Company, which had stood out for many years in the national drive towards increased efficiency among gas undertakings, that Mr. Evans should have spoken so kindly of the work he had been trying to do. He did not mention how much his own Company had done; without his Company the Association could not have been formed. It came in from the very first under Dr. Carpenter, and to-day Mr. Evans' advice was always worth listening to. Mr. Foot went on to thank Mr. Smith and Mr. Charrington for all they had said, and he could reassure Mr. Charrington that it would be the policy of the Central Committee to keep the Association intact; it might very well become inefficient if it tried to become too large. In conclusion, Mr. Foot thanked them very much for the toast; so long as he could do anything for coke he would be available to do it.

Western Juniors Meet at Stroud

Works and District Inspected

A well-attended meeting of the Western Junior Gas Association was held at Stroud on Oct. 16, the arrangements having been made by the Stroud Gaslight and Coke Company.

Members assembled at the Distribution Stores, John Street, where they were welcomed by the Engineer and Manager, Mr. T. H. Woodcock. Those interested in gas manufacture then proceeded to the Company's Works, while those interested in distribution visited two Council estates in which the houses had been carcassed in copper tubing.

Following the visits members were entertained at tea through the courtesy of the Directors of the Stroud Gaslight and Coke Company. The thanks of the Association were expressed by the President, Mr. J. E. Akroyd (Swindon G.W.R.), supported by Mr. A. Tran (Bath). Mr. T. H. Woodcock replied on behalf of the Directors.

Following tea, Mr. W. Barber, Sales Manager, Stroud Gaslight and Coke Company, presented a Paper on "Progress and Gas Sales Development at Stroud," which, together with the ensuing discussion, will be found elsewhere in this issue.

The Effects of Gas Mixing with Particular Reference to the Ott Number

by
P. C. GARDINER,
M.I.Chem.E., A.I.C.

A Paper presented at a meeting of the Eastern District of the Southern Association of Gas Engineers and Managers on Tuesday, Oct. 5.

Gas mixing has always been practised on gas-works even though it were only the inadvertent admission of waste gas and air in the retort house. In recent years the practice has become much more complicated by the introduction of water gas and producer gas (as well as air and waste gas) as diluents. The requirements of the consumers are now more exacting, and the subject deserves serious consideration, particularly in connection with extensions of gas-making plant.

As a matter of history I may say that the earliest efforts at Tottenham to elucidate the reason why some gas mixtures gave more trouble than others in lighting burners were made in 1929, and at that time endeavour was made to correlate the effects of varying specific gravity and calorific value. The immediate result of this enquiry was to show that these two factors alone did not by any means constitute the whole of the story; and it was only after considerable investigation that a complete answer was provided, and even then the theory was somewhat hazy.

It is generally appreciated that by increasing the proportion of diluent gas (be it air, waste gas, producer gas, or water gas) in a coal gas mixture, the specific gravity rises and so the quantity of gas passing the nipple is reduced. The flame therefore suffers from two causes:

(1) Lower calorific value.
(2) Lower gas rate.

Both these alterations have the effect of reducing the quantity of air required for combustion, and with a fixed nipple and fixed air inlet this would have the effect of increasing the air in the flame. If the process were continued long enough the burner would, of course, light back.

The phenomenon of lighting-back is well known, but in order to make myself a little more clear, I feel I should enlarge somewhat on the causes leading up to this back-firing as they constitute essential factors in flame behaviour, and they also form the basis of the Ott Number determination, to which I shall refer later.

The tendency to light back is entirely dependent on the relationship between the rate of travel of the air-gas mixture along the bunsen tube and the speed of propagation of flame in the reverse direction. In these circumstances, if the rate of travel of the air-gas mixture is greater than the speed of inflammation, then the flame burns (with a long or short cone), but if the flame speed is the greater, then lighting-back occurs.

By way of illustration take a simple mixture of, say, methane and air. In the case of such mixtures only those containing more than 5% and less than 14% CH_4 will burn on ignition. With the highest proportion of CH_4 a long flame will be produced and by increasing the air, thus reducing the proportion of gas in the mixture, the speed of flame propagation will be increased until an explosive rate is attained. Under normal conditions in the bunsen burner the explosive rate is never approached, as the speed of the flame exceeds the rate of travel of the air-gas mixture up the tube long before the conditions for explosion are arrived at.

The rate of progress of flame in a tube can be determined with precision and from a series of such determinations a graph can be constructed showing the flame speeds of various air-gas mixtures. By this means the constituents of coal gas are found to have very different flame speed curves; gases of the same calorific value sometimes being totally different. An instance of this is hydrogen and carbon monoxide. Here are two gases of the same calorific value and requiring the same amount of oxygen for combustion, but their flame speeds are very different, hydrogen having a maximum of nearly four times that of carbon monoxide.

Now consider the use of town gas in an ordinary bunsen. As the proportion of air is increased the cone of the gas flame gets smaller and smaller and eventually it practically coincides with the top of the burner. Use has been made of this phenomenon in devising a practical method of ascertaining the relationship between the flame speed and the rate of travel of the air-gas mixture in the burner. The name given to this gauging is the "Ott Number," and it is an effective compromise of all the variables.

The Ott Number is a numerical gauge of the maximum quantity of air permissible before lighting-back is caused in a standard burner. The method was used by Dr. Ott who did a great deal of work in Switzerland some ten years ago and it has been adopted at Tottenham. It should, however, be pointed out that in addition to the upper limit for air determined by the Ott Number there must also be an upper limit for *gas*, when the high proportion of gas is such that the flame is too long to be useful in gas appliances; but this aspect has not been investigated at Tottenham and all the remarks in these notes refer to the region of the lower gas limit only. The Ott Number determination is very simple and consists of carefully gauging the quantity of air required to cause a standard bunsen burner (see App. 1) to flicker preparatory to lighting-back. Besides being constructed to standard dimensions this burner is fitted with a water-cooled jacket around the top of the tube to prevent the striking back heating up the burner sufficiently to affect proper functioning during subsequent tests.

The quantity of air required to cause the flickering of the standard burner is gauged by an indicator on the air slide moving over an arbitrary scale, on which coal gas-air mixture of 500 B.Th.U. corresponds to about 50. This burner, when used under test conditions, gives a gauge of the combined effect of calorific value, specific gravity, and flame speed of the gas from the consumer's point of view. This makes the Ott Number of paramount importance.

It has not heretofore been recognized as such, because in maintaining a steady calorific in gas made by the same process of manufacture, a steady Ott Number is automatically ensured. But as pointed out above, the Ott Number really demonstrates a great deal more than the calorific value; and this is brought out when the gas-making methods are changed. Later on I shall call attention to cases to illustrate this point.

Incidentally it has been found that a gas mixture has a greater range of usefulness the higher its Ott Number, and a graph plotted from a series of actual experiments is reproduced in Appendix 2. The possible variation of the Ott Number without lighting-back has been termed "tolerance."

To turn now to mixing, Table 1 gives the analyses of typical gases produced on gas-works and Table 2 shows the effect of mixing some of these gases to produce 500 B.Th.U. gases. The mixtures indicated consist of straight coal gas to which has been added different diluent gases—air, producer gas, water gas, &c., and my object is to call attention to the variations in flame behaviour which is brought about by different mixtures, even when the calorific value is maintained at 500 B.Th.U. Table 2 summarizes these

TABLE 1.—*Analyses of Gases.*

—	Coal Gas.	Producer Gas.	B.W. Gas.	C.W.G. (350).	C.W.G. (450).	C.W.G. (500).	Waste Gas.
CO_2	2·0	7·0	5·0	4·3	4·6	4·4	17·0
O_2	0·9	0·0	0·1	0·4	0·3	0·7	4·0
Illuminants	3·6	0·0	0·0	2·4	6·0	7·5	0·0
CO	6·4	26·0	40·8	40·2	36·1	35·8	0·0
CH_4	33·1	0·5	0·8	4·0	10·3	13·3	0·0
H_2	48·8	12·0	45·3	38·5	34·8	31·9	0·0
N_2	5·2	54·5	8·0	10·2	7·9	6·7	79·0
B.Th.U./cu.ft.	601	126	284	350	450	500	..
Specific gravity	0·43	0·90	0·58	0·64	0·69	0·70	1·066
Air for combustion per unit volume.	5·214	0·956	2·129	2·879	3·955	4·469	..

TABLE 2.—*Effects of Mixing Various Common Diluting Gases with Straight Coal Gas to Produce a Mixed Gas of 500 B.Th.U./Cu.Ft.*

Gas Mixture. (1)	% Coal Gas. (2)	Specific Gravity. (3)	Air for Complete Combustion per Unit Vol. (4)	Estimated Ott No. (5)	Tolerance to Ott No. Change. (6)	Lowest Limit of Ott No. (7)	Estimated Permissible Drop in C.V. (8)
(1) Coal gas/air . . .	83·2	0·523	4·183	51	7·5	43·5	49
(2) Coal gas/producer gas	78 8	0·527	4·340	53	9·0	44·0	120
(3) Coal gas/B.W. gas .	68·1	0·479	4·221	45	3·5	41·5	34
(4) Coal gas/C.W. gas (350)	59·4	0·513	4·240	44	3·0	41·0	27
(5) Coal gas/waste gas .	83·2	0·534	4·316	55	11·0	44·0	140
(6) Coal gas/C.W. gas (450)	33·2	0·593	4·369	43	2·5	40·5	24

possibilities so far as diluted straight coal gas is concerned, but further mixtures containing three or more of these or other gases could be made up. Their behaviour will, however, in all probability, be found to be within the limits of the specimen gases given in Table 2.

Columns 6 and 8 of Table 2 probably require explanation:

Column 6.—The tolerance to Ott Number change is the extent to which the Ott Number may be changed before a burner, properly adjusted for a gas, will light back.

Column 8 gives the approximate corresponding drop in calorific value which would occur provided the dilution is effected by means of adding more of the same diluent.

Most of the figures given in this Table have been determined practically but some have been estimated and they are given in an attempt to give a better mental picture of the possibilities of such changes.

In the case of the coal gas-air mixture of 500 B.Th.U. the Ott Number is 51 and, with a properly adjusted burner the Ott Number of the gas could fall by reason of change of composition to 43·5 before lighting-back would occur; and if this change was brought about by adding more of the same diluent, air, then the calorific value would have dropped to 451.

This coal gas-air mixture is, of course, a very old type of gas which has for obvious reasons been banished from modern works, but the figures show that there is considerable latitude in using such a mixture, 7·5 with Ott Number and 49 B.Th.U. in the calorific value.

Turning to another common mixture (No. 4), the tolerance to change of Ott Number is much less and this is the reason why lighting burners are more sensitive to varying proportions of water gas than to similar alteration when using other diluting gases.

On the other hand, diluting with waste gas or producer gas gives a greater tolerance to change as will be seen in (2) and (5).

At first sight this is perhaps rather surprising but there are two reasons:

(1) A relatively small proportion of waste gas or producer gas is required to reduce 600 coal gas to 500.
(2) The N and CO_2 act as dampers and slow up the combustion. In the case of dilution with air the beneficial effect of the nitrogen is nullified by the presence of oxygen.

The other mixtures referred to are obtained by diluting the coal gas with B.W. gas and 450 C.W. gas, respectively, the latter giving a mixture containing 67% water gas. The last-mentioned mixture is the extreme case inasmuch as it represents the gas which would be made by using all the coke produced in the retort house on the C.W.G. plant.

Considering, therefore, any *one mixture*, it will be seen from Table 2 that a substantial variation in the proportions must be made before trouble can possibly be caused. Any variation which would seriously affect the burners would approach and might exceed the penalty limit of 5% of C.V. laid down in the 1920 Act. In the case of a coal gas-waste gas mixture the calorific would have to fall over 100 B.Th.U. before causing lighting-back.

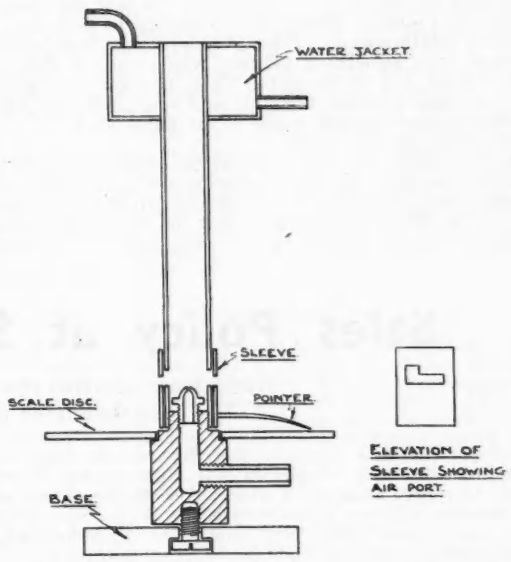
So far so good, but there is another aspect and this is the one to which I wish particularly to call your attention. A very different state of affairs appears when the *constituents* of the mixture are changed, as when a coal gas-air mixture is substituted by a differently constituted gas.

In line 1 of Table 2 the possible fall in Ott Number of the coal gas-air mixture is given as from 51 to 43·5 but it will be seen that the substitution of a coal gas-blue water gas mixture of 500 B.Th.U. (No. 3) immediately reduces the Ott Number to 45, after which a drop of calorific of only 15 B.Th.U. will cause lighting-back.

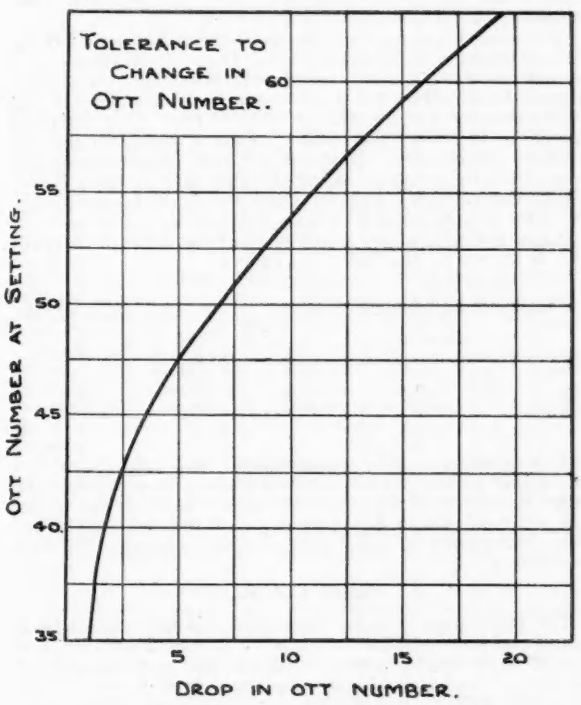
Again the substitution of gas No. 6 (Table 2) would cause the immediate lighting-back, although that gas is still of standard statutory quality—*i.e.*, 500 B.Th.U.

What I am anxious to make clear is that the functioning of gas appliances is not likely to be seriously affected by changes in calorific usually met with so long as the constitution of the gas mixture does not vary, but on the other hand, the substitution of one mixture for another, even of the same calorific, can have serious effects and might cause lighting-back in burners which have previously behaved normally.

Such conditions could easily arise if two works operating on different lines attempted to serve the same area alternately. This subject, therefore, deserves the particular attention of engineers who are concerned with amalgamations which are now so popular.



Appendix I.—Ott Number Burner (Tottenham Pattern).



Appendix II.—Tolerance to Ghange in Ott Number.

(Deas, Ref. (116), and Hawes, Ref. (117).)

NOTE.—The Ott Numbers on this diagram are on an arbitrary scale used by the Tottenham Gas Company. Ordinates represent Ott Numbers of adjustment gas; abscissæ the drop in Ott Number to cause lighting-back.

APPENDIX III.

Constant Specific Gravity with Constant Calorific Value.

B.Th.U.	493	492
Specific gravity	0·500	0·503
Carbon dioxide	1·6	3·4
Oxygen	1·2	1·4
Illuminants	2·6	3·0
Carbon monoxide	5·0	15·6
Methane	27·8	21·4
Hydrogen	41·9	45·9
Nitrogen	19·9	9·3
Ott Number	54	44
Effect on lighting burner	Max. illumination	Lights back explosively

A point which should be emphasized is that the gauge of usefulness taken in these notes is ability to burn the gas without lighting-back. This standard has been adopted because it is something definite which can be measured but it must not be forgotten that, previous to lighting-back a flame becomes unstable and short, and the effects of the changes are noticeable in the flame long before the actual lighting-back occurs.

In Appendix III. will be found the analyses of two gas mixtures having the same calorific value and the same gravity but possessing very different Ott Numbers—viz., 54 and 44. The peculiarity is that, in spite of their similarity in both calorific value and gravity, a burner properly adjusted on the first gas will light back immediately with the second mixture.

At first sight it may appear that the findings referred to above tend to condemn water gas as a diluent, but this is not so. Water gas can be used in substantial proportions without causing trouble so long as the Ott Number is maintained at a reasonably high figure. In support of this I would refer you to Mr. C. A. Deas's Paper before the Southern Association last year in which he stated that he distributes a coal gas-water gas-producer gas mixture containing up to 25 or 30% of water gas without any trouble arising.

I cannot conclude these notes without reference to a Paper read before the London and Southern District Juniors in February last by Mr. F. O. Hawes, of Tottenham, who is also responsible for the construction of the burner shown in Appendix I., for the graph and examples in Appendices II. and III.

The points brought out above suggest that the Ott Number might, with advantage, be standardized, and the gas thereby kept within certain limits. Steady calorific value, important as it is, is insufficient for present-day requirements on the district, and this is particularly noticeable in the case of lighting.

Specific gravity, although worthy of notice, is relatively unimportant unless the variation is sufficient substantially to affect the output of B.Th.U., in which case the Ott Number will be affected also.

Composition of gas is of great importance, the essential characteristics of which are readily indicated by the Ott Number determination.

Sales Policy at Stroud

From a Paper delivered at a Meeting of the Western Junior Gas Association at Stroud on Oct. 16.

By W. BARBER,
of the Stroud Gas Light and Coke Company.

The present showrooms of the Stroud Gas Light and Coke Company were opened in May, 1926, and it is interesting to record that every gas cooker displayed was sold the first day. From 1921 onwards the Works were gradually brought up-to-date, and new plant, including siding and gantry, charging and discharging machinery, coke conveyor, high-pressure plant, gas-drying, benzole recovery, and recently coke grading and screening plant, was installed, while on the district gas mains were extended and new areas developed with exceptionally good results.

The area of supply includes the whole of Stroud Urban, Stroud Rural, Nailsworth Urban District, Tetbury, and numerous other parishes in the Tetbury and Cirencester Rural Areas. The total area supplied is over 112 sq. miles, serving a population of over 60,000. The length of mains is well over 128 miles. Stroud and District, including Stonehouse, Nailsworth, and Minchinhampton, are served by a system of low-pressure mains, while Painswick, Brimscombe, and Chalford are served by a high-pressure system, as also will be Tetbury in the future.

Since the war, rapid progress has been made in Stroud; this is shown by the following figures:

Year.	Sales of Gas.	Wages.	Capital.	Main Mileage.
	Million Cu.Ft.	£	£	
1913	141	4,555	99,000	86
1923	163	10,798	107,000	88
1933	193	12,599	141,000	102
1936	237	14,888	172,000	128

Extensions are still taking place, and gas mains are being laid at the present time in France Lynch, some six miles distant, and in the near future gas will be available to residents in Eastington and Randwick, and from these extensions we shall have between 400 and 500 new consumers.

Sales Policy.

The foundation of a successful sales policy should be a sound and efficient distribution system with a good quality gas at a reasonable price; adequate and well-maintained pressure; well-trained and organized fittings, sales, and advisory staff; well appointed and equipped showrooms; and last, but by no means least, the development of goodwill and confidence between consumer and undertaking. The opening of the showrooms in 1926 marked the beginning of further development in Stroud, and since inaugurated have more than justified their existence. The present premises, which are centrally situated in one of the principal streets of the town, are simple in design and character, the style of decorations being such that a complete change can be effected at a very small cost.

Without a doubt a showroom is the centre of gas sales activities, and is one of the most essential and important links between the public and the undertaking, and as such should be a place where the consumer can see the many uses to which gas can be applied. Unfortunately, the accommodation at Stroud is somewhat limited, in consequence of which only a small range of domestic equipment is in actual operation, but the best use has been made of the space available. The windows and the showrooms are changed week by week; by so doing, the stock always presents a smart appearance and never becomes soiled. Literature is placed weekly in chromium plated holders fixed at intervals on the walls; all fittings and appliances are ticketed showing the cash and hire-purchase prices, and attractive showcards bearing prices and slogans are used freely. Every effort is made to avoid overcrowding in the lay-out of equipment. Good lighting, both in the showroom and windows, is another matter which receives careful attention, all gas fittings, burners, globes, &c., being cleaned each week.

Stores and Fitting Work.

Owing to the increased demand for apparatus, it was found necessary to seek more accommodation, and four years ago the John Street premises were purchased by the Company. The ground floor serves as workshops, cooker store, paint and display store, and mess room; the second floor is given over to stores, office, and general fittings store, while another room is used as a club room or for demonstrations. In addition to these premises we have considerable storage accommodation at Brimscombe Gas-Works, which is used for the storage of domestic wash boilers and other bulky apparatus. To ensure that the demands of the public shall receive prompt attention, it is our policy to maintain good stocks of fittings and equipment, &c., and so that adequate supplies are always to hand, a simple stock card system with a minimum and maximum line was introduced some five years ago. It is very rare for a consumer to be kept waiting through depletion of stock.

At this stage I should like to describe briefly the methods employed at Stroud with regard to the installation of equipment. With gas cookers, for example, it has been our practice for some time past to fix all vitreous enamelled cookers with chromium plated feed supply pipes, elbows, and main control cocks, while at the back, attached to the flue outlet, a small vitreous enamelled wall shield is fixed, which is easily detached for cleaning purposes. This prevents discoloration of the wall behind the cooker, and has proved most satisfactory.

Gas boilers, radiators, and fires are fitted with chromium

plated safety drop floor or full way cocks and tube, while enamelled wall shields are included with boilers. Surrounds made of asbestos cement in artistic colourings to match gas fires are installed wherever possible. These are fitted by means of wood strip, usually sprung and screwed into the fireplace and secured by means of loose round-headed chromium plated screws. Small sink heaters, geysers, and multi-point heaters are fitted in all instances with chromium plated gas and water tubing. During the past fifteen months it has been our practice to run all supplies to and from the heater in copper tube, and where the pipe lines are exposed on face walls chromium plated copper tube is used. White glazed or coloured asbestos cement flue equipment is used, which, together with the stainless pipe lines and fittings, adds to the appearance of the installation. The fitting of chromium plated tubes and fittings is definitely more costly than the usual method employed, but I think you will agree that a job carried out in that manner is well worth while.

Gas Lighting.

Gas lighting is still, I am pleased to say, very popular in our area of supply, and in spite of competition we are making phenomenal headway. Since 1931 we have installed over 17,500 pendants and brackets, and up to the end of September this year over 1,600 lighting sets have been fitted. Much of the success of this achievement is due to an extensive campaign some four years ago, when it was decided to supply and fix a pendant or bracket with burner, diffuser, mantle, and globe, and piping up to 12 ft. for 12s. 6d. This charge has recently been increased to 14s., due to rising prices. All pipe used in excess of 12 ft. is charged at 3d. per ft., inclusive of labour.

It is due in no small measure to our maintenance scheme introduced some few years ago that we have retained and extended our lighting load. No charge is made for this service beyond replacements and renewals; a well-trained staff of maintenance fitters is engaged on the work, and periodical visits are made to the houses of consumers. All appliances are included in the scheme. Enquiries for additional equipment, &c., are transferred to the showrooms, where arrangements are made for one of our inspectors to call on the consumer with the necessary information and advice required.

Direct contact is made with builders by our Inspectors, who call on them frequently. New apparatus is introduced to them, new literature is sent, together with special order cards at frequent intervals, invitations extended to attend special lectures, to visit the showrooms, make full use of our advisory service, and on special occasions, such as our annual dinner and outing, we welcome them as our guests. The result of this co-operation has done much to eliminate cheap, shoddy, and inferior equipment, the fixing of undersized supply pipes, and fittings of poor quality, with nothing but cheapness in first cost to recommend them.

All plans for new houses passed by Councils are noted, and contact is immediately made with the builder or architect concerned. In practically every case we record a satisfactory result. Having secured the business, our inspectors make periodical calls during building operations, and immediately the house is roofed the internal carcassing is commenced; wherever possible all pipe lines are concealed. The installation is then passed by the inspector responsible for the job, the actual fixing of the appliances selected being done just before the house is ready for occupation.

In addition to private schemes, some 500 Council houses have been erected by the Stroud Urban and Rural District Councils during the past five or six years, and in every instance gas has been specified for cooking, heating, washing, and ironing, while a lighting system has been included in over 250 houses erected, with an average of seven lighting points per house. It is specified that all gas fitting shall be carried out by the Stroud Company.

During the past fifteen months all houses have been completely carcassed with copper tube and fittings, and this has been found very satisfactory. The use of copper has now been extended to the installation of hot water equipment, and it is hoped that this will be the means of reducing our maintenance costs on hot-water equipment, as instead of de-scaling every quarter, once a year will be sufficient. This alone will balance the extra cost of the copper as against other methods usually employed.

The cost of carrying out installations in copper is slightly in excess of those of compo or wrought iron, and the following will give you some idea of the difference in cost:

Taking as an example Council houses, which are divided into two classes—namely, A and B, the specifications for which are as follows:

Type A.—Gas cooker, panel fire, vitreous enamelled boiler with bath attachment, gas iron point, and seven lighting fittings.

Type B.—Gas cooker, panel fire, vitreous enamelled boiler with bath attachment, and gas iron point.

TYPE "A."

—	Cost of Appliances.	Cost of Material.	Cost of Labour.	Total.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Installation in compo .	3 9 6	3 11 10	1 16 8	8 18 0
,, in copper .	3 9 6	4 8 3	1 10 0	9 7 9

TYPE "B."

Installation in compo .	3 9 6	1 17 5	1 3 4	6 10 3
,, in copper .	3 9 6	2 7 9	1 0 0	6 17 3

It will be seen that the difference in favour of compo on Type A houses is 9s. 9d., while Type B shows a saving of 7s. per house carcassed, and although the costs are higher for copper, consideration must be given to lower maintenance charges and longer life, &c. The comparisons quoted cover 180 houses over a period of 15 months.

It is interesting to record that gas sold for industrial purposes accounts for approximately 15% of our output, and here I might mention a few of the industries where gas is used. Chief among these are casein products, esther gum, paint and varnish, pin manufacturing, paper bag drying, incubators, umbrella stick making and bending, furniture, office equipment, large scale ham cooking, bacon curing, asbestos cement equipment, wood-turning, and catering.

Discussion.

Mr. A. TRAN (Bath) asked for more information about copper tubing reducing the amount of de-scaling necessary in water heaters. He was aware that galvanized tube overcame the trouble which was experienced when ordinary iron pipe was used for water, but did not see how copper tube could prevent scale formation. He also enquired what type meter connections were used with the copper installations.

Mr. BARBER, in reply, said they had found even with galvanized tube for hot water pipes, scale had to be removed after six months. The meter connections were made by sweating the copper to the ordinary cap and lining fitting.

Mr. F. A. RHEAD (Exeter) enquired whether there was any difference in the frequency of the visits of maintenance men to lighting and other types of fittings. What was the opinion in Stroud of long term hire-purchase agreements for enamelled cookers, and where a salesman failed to sell a gas fire, was an attempt made to push a coke grate?

Mr. BARBER said that the maintenance of lights except in special cases was done twice a year. Hospitals, churches, &c., were visited more often. Other apparatus was systematically visited, but this did not amount to two visits a year. It was their experience that three-year hire-purchase periods were most favoured by the consumer; they did not encourage anything longer than 5 years, though a 7-year agreement could be concluded. They had a special "Coke Week" each year when fires of the "Eagle" type were offered.

Mr. W. A. CHARD (Gloucester) asked if the visit of the maintenance fitters was to a portion of the consumers with certain types of fittings or whether it was a general census.

Mr. BARBER replied that a general census was done at definite intervals.

Mr. F. G. CRAXFORD (Bath) asked what percentage of the lighting fittings given in the tables each year was new work. He had experience of copper tube work but had not found the saving in labour appreciable.

Mr. BARBER said that 85% of the fittings each year represented new work. In the case of the labour items with copper tube, very careful records had been kept, and while it was admitted that the men on this work were specially picked for the job, a saving of about 2¼ hours per house was found with copper.

Mr. A. G. HOLTAM (Cheltenham) said comparisons had been given of compo and copper, but had the Author any figures for a job in iron pipe, as he always regarded this as the cheapest form of pipe?

Mr. BARBER said no houses had been carcassed in iron since he had been at Stroud, and he could not supply any costs for this material.

Mr. A. B. HORSFIELD (Bristol) thought the labour costs were high for both classes of work and the total cost of an installation was high too. He wondered whether these figures were considered favourably by speculative builders. Regarding the capillary joint he did not like it and expressed a preference for the older method of piping.

Mr. BARBER said that the labour charges included travelling costs, and this item was appreciable as the work was a good distance from the stores. They were on good terms with the builders and did a lot of work for them. Regarding capillary joints their experience only extended over 18 months, during which time they had had no trouble.

A vote of thanks and congratulations to the Author was moved by Mr. S. SMITH (Bristol), supported by Mr. S. B. JONES (Clevedon), and was carried with acclamation.

NOTES ON

Thermostatic Controls for Coke Fired Boilers

by
L. H. ARDLEY,
Gas Light and Coke Company.

A Paper read before the London and Counties Coke Salesmen's Circle on Oct. 13.

The subject of thermostatic controls covers a very wide field and includes some hundreds of different types of equipment, from the small regulator, such as those fitted to domestic boilers, up to elaborate and expensive equipment for large power plants. It is impossible in a Paper of this length to deal with more than a very small part of the subject, and this Paper will, therefore, be confined to controls for coke-fired medium-sized central heating and domestic hot water boilers, such as are installed in blocks of flats and offices at the present time.

Controls are necessary if the highest efficiency and maximum value for fuel used are to be obtained and to ensure economy of fuel and labour, accuracy of temperature or pressure, and safety—*i.e.*, to eliminate, as far as possible, the human element.

(*a*) *Economy.*—Coke-fired boilers are frequently designed as radiant heat converters; that is, they transfer the heat in the coke to the water mainly by radiation from the fuel bed to the walls of the boiler, and thence through the walls by conduction. Maximum efficiency is therefore obtained by maintaining the fire in a radiant condition all the time, and this is best achieved by the addition of fresh fuel in small quantities at frequent intervals, combined with a careful regulation of the dampers.

In a hand-fired installation, where the boiler attendant is usually a porter with other duties to perform besides looking after the boilers, he will tend to overfill the fire-box in order that the fire may last as long as possible between attentions, which is extremely wasteful because the fuel bed is, for the majority of the time, covered with cold dead coke, resulting in inefficient combustion and large temperature fluctuations.

(*b*) *Temperature.*—Hand control of the rate of combustion also results in widely varying temperatures due to the fact that the temperature must alter before the change becomes obvious, and when correction is applied it is usually overdone and the temperature then goes to the other extreme. Unexpected variations in demand aggravate this trouble, especially in the case of domestic hot water supplies.

(*c*) *Safety.*—It will be realized that if the latter condition occurs while the attendant is absent a very high temperature may be attained, setting up serious stresses in the boiler and in extreme cases damaging the plant. Thermostat controls are therefore necessary because they can, and will, satisfactorily take care of all the above points if carefully designed and installed.

Methods of Control.

(*a*) *Regulation of Fuel.*—Before proceeding to describe the various pieces of equipment used in detail, the Author feels that a brief outline of the method employed would not be out of place. It will be realized that with gaseous or liquid fuels the heat output can readily be controlled to meet fairly rapid changes in heat demand, either manually or automatically by regulation of the quantity of fuel fed to the burners.

(*b*) *Regulation of Combustion.*—With solid fuel, however, such as coke, this regulation can only be accomplished indirectly, and it is usually done by regulating the rate of combustion by means of the air supply to the fire.

The method employed, therefore, is to control the draught—that is, the quantity and velocity of the air and products through the fire and flues by means of the dampers.

In its simplest form, thermostatic control for a heating boiler would consist of a fractional H.P. motor operating the dampers and controlled by a room thermostat, together with a boiler limit thermostat fitted in the main flow pipe. The boiler thermostat is arranged to take precedence over all other thermostats, in order to prevent the boiler temperature exceeding a safe figure under any circumstances.

(*c*) *Variations.*—By an elaboration of this arrangement, the water temperature can be varied automatically to suit variations in outdoor air temperature. This is known as the "Variostat" system; also, in dual systems where the boilers supplying domestic hot water as well as heating, the controls can be arranged to direct the boiler output into either or both systems in accordance with demand, even allowing, where necessary, for the domestic load to take preference over the heating load for a short period. If, however, the natural draught is insufficient for the load conditions of the boiler, the air for combustion may be supplied by means of a fan. In this case, the thermostats would control the fan, and the chimney damper would be set to give the maximum efficiency.

The number and type of thermostats fitted will depend on the local conditions of the job, together with the closeness of control required. The usual practice, however, is to install a water temperature thermostat, together with a room thermostat or variostat on heating boilers.

Domestic hot water installations are fairly simple to deal with, as the only controls necessary are a boiler thermostat, damper motor, and a calorifier or cylinder thermostat to shut down the boiler when the storage is up to temperature.

The room thermostat shuts down the boiler when the air temperature in the room in which it is fitted equals that to which the instrument is set. It is, therefore, necessary to choose the position for this thermostat with great care, as it will act as a key for the whole building. The variostat, on the other hand, varies the water temperature inversely as the outdoor air temperature; thus, in effect, it anticipates the needs of the building.

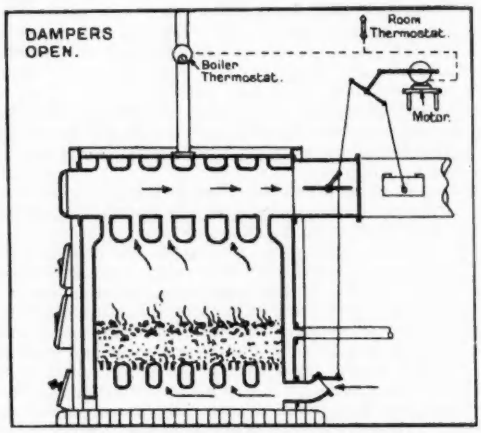


Fig. 1.—Diagram of Simple Boiler Control.

Another method, which is particularly useful for dual systems, is to run the boiler at a constant temperature and to let the room thermostat control a motorized valve on the heating circuit, and, in addition, to place a thermostat in the calorifier and arrange to close the motorized valve during periods of large demand for domestic hot water, in order to turn the full output of the boiler to this purpose.

(*d*) *Safety Devices.*—Since one of the objects of thermostatic controls is to eliminate the human factor, it will be appreciated that it must be reliable, but if it should fail, it is essential that it should fail safely—*i.e.*, it must close the dampers. This condition is usually met by installing a motor which requires power to keep the dampers open, and weighting the dampers sufficiently to ensure them closing by gravity if power fails. A telescopic connecting rod between the motor and dampers was tried, but a good deal of trouble was experienced, owing mainly to dirt and friction, so it was abandoned.

Details of Equipment.

The operating medium generally employed is electricity, mainly because of its comparatively low installation cost, hence the equipment described in this Paper is arranged accordingly. Water under slight pressure, or compressed air, can also be used and, in fact, give a smoother control, but has disadvantages in initial cost and upkeep.

(*a*) *Direct Acting Thermostats.*—Under this heading are included all thermostats which operate the dampers directly or through levers only, without the intervention of electricity, water, or compressed air.

The commonest regulator of this type is the vapour or

fluid pressure type, and consists of a sealed copper bellows filled with a fluid having a large coefficient of expansion. This unit is immersed in the water and the expansion movement of the bellows is increased by means of a lever which is connected to a damper, usually the air inlet. Another type consists of a long bimetal strip, which has one end fixed to the waterway of the boiler and carries a small damper at the other end. As the temperature varies, the strip bends, due to the unequal expansion of the two metals of which it is made, thus opening or closing the damper.

There are many variations of these types, but they all have the disadvantage that the power developed is comparatively small, and consequently they are only suitable for small boilers where the operation of one light damper gives sufficient control.

(*b*) ***Damper Motors.***—In order to overcome the limitations of the direct acting thermostat, the dampers are operated by means of a small motor, the thermostat only having to control the energy supply to the motor, thus enabling a lighter and more sensitive thermostat to be used.

The motors used fall into two main groups—(*a*) those requiring power to make both opening and closing movements, and (*b*) those which require power to open, but which close by means of gravity or a spring. Each of these groups can in turn be sub-divided into types according to the motive power employed.

One example of the Group (*a*) type for electrical operation is the "Satchwell Pulling Motor" which consists of a very small fractional H.P. motor, driving a crank through a train of gearing and fitted with a selector switch of the commutator type, the whole being enclosed in a strong, die-cast aluminium case, making a light, but robust, power unit. The motor runs at about 2,000 r.p.m., while the crank runs at about 1 r.p.m., the large speed reduction enabling a very large torque to be developed; although the current consumption is only 30 watts (1/30th H.P.) the torque is 30 in. lb.

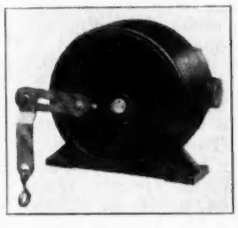


Fig. 2.—"Satchwell" Damper Motor.

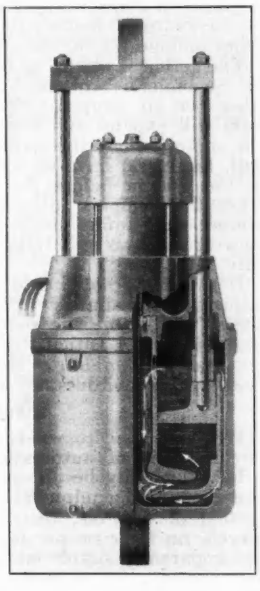


Fig. 3.—The B.T.H. Electro-Hydraulic Thrustor Unit.

The sequence of operation is as follows: When the controlling thermostat demands heat, it completes a circuit through the selector switch to the motor. The motor then runs until the final shaft carrying the crank has completed half a revolution, which, in turn, opens the dampers. At the end of the half revolution, the selector switch interrupts the circuit and stops the motor. The dampers remain in the open position until the demand for heat is satisfied and the thermostat switches over to the hot contact, when it completes an alternative circuit through the selector switch to the motor, which then drives the crank through a further half revolution and closes the dampers, the selector switch again stopping the motor at the completion of the half revolution, which remains thus until the thermostat returns to the cold position.

It should be noted that the motor always runs in one direction and that it only consumes power while running. The Drayton Type "O" motor is of the same type, with similar characteristics. There are now several motors on the market, which come into the Group (*b*) class—*i.e.*, use power to open the damper but close under gravity, such as the B.T.H. Thrustor, the B.T.Co. "Teddington" Damper Unit, and the Detroit heat motor.

The B.T.H. Thrustor and the "Teddington" motor are both of the electro-hydraulic type, consisting of a small motor-driven pump, which forces oil from a reservoir into a pressure chamber, which consists of an annular cylinder and piston in the B.T.H. Thrustor and a bellows in the "Teddington" motor, the movement of the piston or bellows being transmitted to the dampers through a push

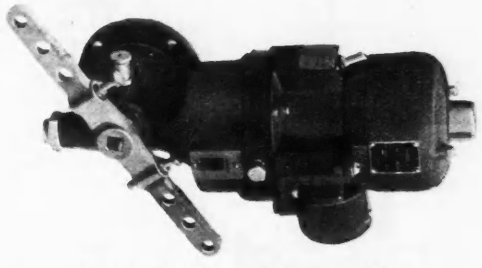


Fig. 4.—"Teddington" Damper Unit.

rod and lever. As soon as the power is switched off, the pump stops and the piston returns, due to its own weight and the weight of the dampers, aided by a spring in the "Teddington" unit.

The heat motor, on the other hand, operates on a different principle. The "motor" consists of two main parts, a small phial filled with fluid and a copper bellows, the two being connected together by means of a small tube. The phial is surrounded by a heater coil, which boils the fluid over into the bellows and expands them.

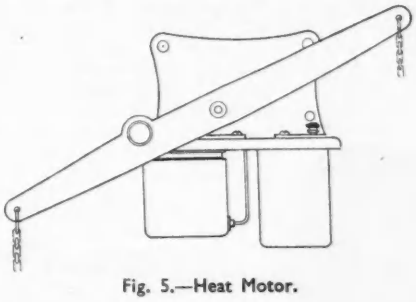


Fig. 5.—Heat Motor.

The expansion of the bellows is arranged to operate a lever bar, which is connected to the dampers. When current is switched off, the phial cools and allows the gas to condense, a strong spring compressing the bellows and forcing the fluid back into the phial.

Since all three of these motors require power, not only to open them, but to keep them open, any failure of the power supply immediately closes the dampers, hence they fulfil one of the principal conditions of safety.

Another motor of the safety type is the Drayton Diaphragm Motor, which uses water or compressed air instead of electricity for its operation. A governed water supply

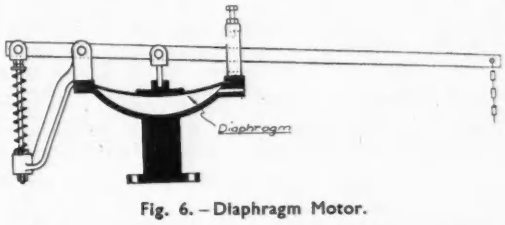


Fig. 6.—Diaphragm Motor.

passes through the thermostat to the motor, the lever of which is connected to the dampers. The thermostat, known as the "A.M. Regulator," is of the rod and tube type, in which the movement of the rod is made to open or shut a water run-off valve or leak port. Thus, when the temperature of the boiler water is below that required, the leak port is closed, and the full water pressure applied to the underside of the diaphragm gradually moves the lever attached to this diaphragm, which in turn operates the boiler dampers. The reverse operation takes place when the boiler water temperature is above that required.

There is an intermediate position in which the leak port is partially open. This type of regulator, therefore, gives a "floating control." The operating differential is about 2° F. and the water consumption approximately one gallon per hour.

The capital and installation costs are, however, higher than with electrical controls, although the power developed

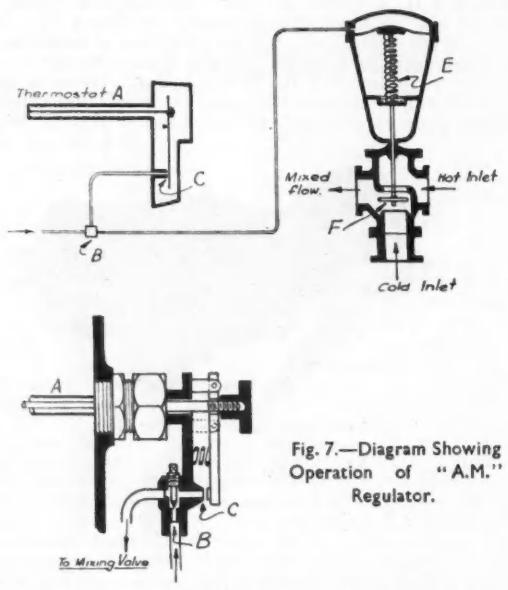


Fig. 7.—Diagram Showing Operation of "A.M." Regulator.

with a water pressure of 15 lb. per sq.in. is approximately 900 in. lb. This type of control is, therefore, more suitable for the larger boilers.

(*c*) *Indirect Acting Thermostats.*—These fall into three main types—(*a*) Contact, (*b*) Rod and tube, and (*c*) Vapour pressure.

The contact thermostat, as its name implies, is designed to clamp on to the pipe whose temperature is to be controlled and transmits the heat to the temperature sensitive element by conduction.

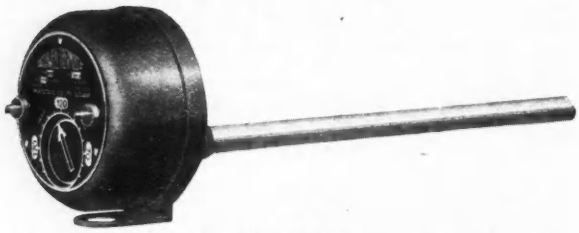


Fig. 8.—Typical Rod and Tube Water Immersion Thermostat.

The rod and tube thermostat, however, has the temperature sensitive element immersed in the fluid whose temperature is being controlled and the vapour pressure thermostat consists of a bellows and phial connected by a small bore tube and filled with a volatile fluid. The phial, or bulb, is immersed in the fluid whose temperature is being controlled and the expansion of the volatile fluid expands the bellows, which in turn operates the switch or valve.

The rod and tube or vapour pressure types, having their temperature sensitive elements immersed in the water, are naturally more quickly responsive to changes of temperature. A good instrument will have a total differential as small as 4° F., although the normal is about 6°-8° F.

The contact type thermostat is not so sensitive and is more dependent on the rate of temperature change, but it is useful when, as sometimes occurs, an immersion instrument cannot be fitted. The movement of the temperature sensitive element is arranged to operate an electric switch, or a small pilot valve when water or compressed air is the operating medium. Air, or room, thermostats operate on the same principle, but usually consist of a bimetal strip only, in order to keep the size of the instrument as small as possible.

(*d*) *Differential Thermostat.*—The differential thermostat, or "variostat" as it is sometimes called, is a special thermostat designed to vary the temperature of the water in a heating system in accordance with the demand for heat, and is, in effect, two thermostats arranged to operate one switch or pilot valve.

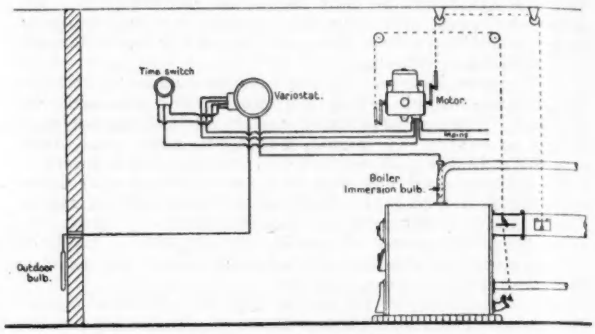


Fig. 11.—Diagram Showing Installation of Variostat.

It consists of two bulbs connected by flexible capillary tubing to a bourdon tube or bellows, the whole system being filled with a liquid sensitive to temperature changes. The two bulbs are so proportioned that the switch is actuated when the water temperature reaches the point required to maintain a comfortable room temperature; one of the bulbs is mounted in the boiler flow pipe and the other outside the building in the open air.

The action is briefly as follows: Assuming that the water in the boiler is at 180° F. and the air outside is 30° F., when the air temperature rises, the liquid in the outdoor bulb will expand and operate the switch and so, through the motor, close the dampers. The water in the boiler will, therefore, have to cool down and contract the liquid in the system before the switch can operate again and allow the dampers to open. Thus, a rise in outdoor air temperature automatically reduces the heating water temperature and so maintains a constant indoor air temperature.

It should be noted that the boiler water temperature is adjusted immediately a change in outdoor temperature occurs and before the room temperature varies, thus this type of control anticipates variations in the heat requirements of the building. Moreover, the opening of windows in any one room does not affect the building as a whole.

Installations.

We now come to what, in my opinion, is the most important part of automatic controls, their installation.

It will readily be appreciated that no matter how good the individual equipment may be, or how elaborate the system of controls, their ultimate success depends very largely on their proper lay-out and installation, and even the apparently simple job often has some nasty pitfalls for the unwary, as no two plants are exactly alike in all characteristics.

(*a*) *Electrical Circuits and Wiring.*—The electrical cir-

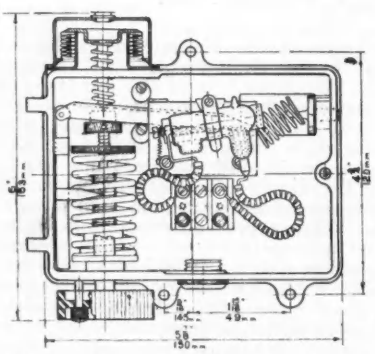


Fig. 9.—Diagram of "Teddington" Vapour Pressure Thermostat.

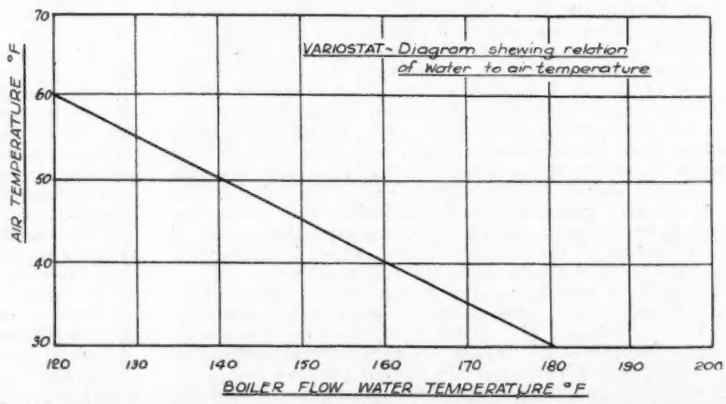


Fig. 10.—Graph showing Relation of Water Temperature to Outdoor Air Temperature on which the Variostat is Based.

cuits employed depend upon the type of motor—*i.e.*, two or three wire, and the supply available.

The most convenient and generally employed supply is single phase alternating current of 200 to 250 volts, with direct current of the same voltage as next best. Where three phase current only is available (it is usually 440 volts) a special relay or transformer has to be used. Lower voltages can be used, but usually mean special motors and thermostats, owing to the higher current and consequent increased risk of arcing at the contacts, especially with direct current.

Figs. 12 and 13 show typical circuits for two and three wire systems and are self-explanatory.

The wire used is usually standard vulcanized india-

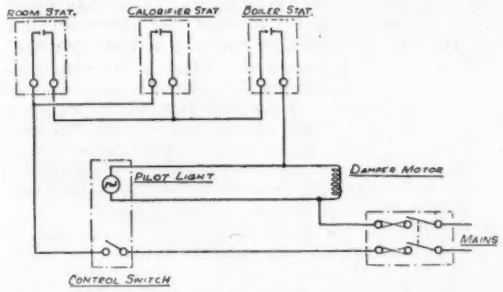


Fig. 12.—Two-Wire Circuit for Automatic Controls.

rubber (V.I.R.) cable, although if it is likely to get very hot—as sometimes happens where it has to be installed close to a boiler—asbestos-covered cable is used. The smallest wire permitted for such work is 1/·044—*i.e.*, one strand of wire 0·044 in. diameter—and this is amply large enough to carry the current. It is usual, however, to use 3/·029 cable, because with three strands the risk of breakage is less, although the current-carrying capacity is almost the same—viz., 6·1 and 7·8 amps respectively.

All wiring is, of course, run in heavy gauge welded conduit with screwed connections, except when lead covered. The latter, however, is not generally permitted within the L.C.C. area or in public buildings.

(*b*) *Lay-out of Controls.*—Thermostatic controls perform two main functions:

(1) Control of combustion, that is, boiler control.
(2) Control of circulation, that is, regulation of the quantity and temperature of the heating medium (water or steam) supplied to the radiators, calorifiers, &c., in accordance with demand.

In a simple system where the boiler is supplying heating only the two functions are combined by allowing the room thermostat or variostat to control the boiler directly.

Before a system of controls can be laid out, certain main factors must be known—namely,

Number, type, and size of boilers.

Whether central heating or domestic hot water supply only, or both.

Power supply available.

Type of building—*e.g.*, flats, offices, shops, or private house.

Other minor information, such as pipe sizes, &c., will be required before installation, but the above is sufficient to enable a scheme to be prepared.

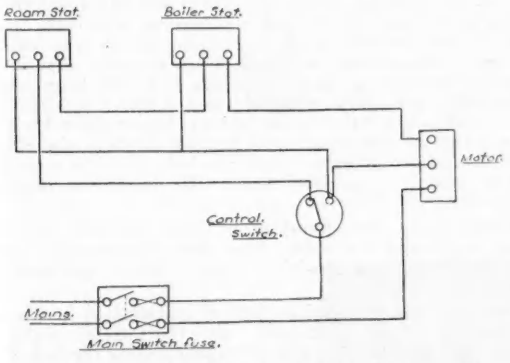


Fig. 13.—Three-Wire Circuit for Automatic Controls.

For example, assume we have to provide thermostatic control for the heating system of a moderate-sized block of flats. This can be done in several ways, such as key room, variostat, or zone control, or a combination of these. The system decided upon depends chiefly on the size of the building, because the possibility of selecting a key room which will give a really representative temperature for the whole block in a large or high building is very remote. Key room control is, therefore, usually only satisfactory in a small building, such as a private house, or where comparatively small sections of the building can be controlled separately. This is zone control, and is usually carried out so that the north and south aspects are controlled separately. Where, however, the building is too large for satisfactory key room control, yet not large enough to justify the cost of zoning, the variostat system gives the best all-round control, because it varies the flow water temperature in accordance with the outside air.

A single key room thermostat or variostat would control the boiler directly through the damper motor, with, of course, a master water thermostat to prevent overheating of the boiler. When more than one air thermostat is used, as with zone control, they would each control a motorized valve on the main supplying their zone.

A variation of these, which has been found to give very satisfactory results, is to fit an ordinary immersion thermostat in the return main near the boiler. A moment's thought will show why, since the heat loss from the radiators will be greater on a cold day than on a warm one, the water returning to the boiler will also be colder and the thermostat will open the dampers. Conversely, as the building warms up, the heat loss becomes less and the water returns warmer. It has, however, the same disadvantage as a room thermostat, that is, open windows and subsidiary heating adversely affect it, though not to the same extent. As a control it comes therefore between the room thermostat and variostat, being better than the former, but not so good as the latter.

Although it must be remembered that the variostat takes no account of subsidiary or incidental heating, such as fires, lights, or body heat, as would the room thermostat or return water stat, it often happens, however, especially in the smaller blocks of flats, that both the heating and the domestic supplies are obtained from the same boiler. When this is so, we cannot allow the heating thermostat to control the boiler directly because in all probability the domestic supplies would be starved, since hot water is required at all times for baths, washing-up, &c., whereas the heating may not be required during the afternoon and evening or, at least, the demand will be reduced due to the natural rise in outdoor temperature.

The usual method, therefore, of controlling dual systems is to run the boiler at a constant temperature of about 170°-180° F. by means of a boiler thermostat and damper motor, and to control the heating and domestic circulation separately. There are several different ways of doing this and the system adopted depends on the size of job and amount of money the user is prepared to spend.

The various methods may be briefly described as follows:

(1) Boiler control only.
(2) Boiler control and heating circulation control. Domestic circulation uncontrolled.
(3) Boiler control and heating circulation control with thermostat in domestic storage to give precedence to the domestic supply.
(4) Boiler control and separate controls to both heating and domestic circulations.
(5) As (3) with additional connection to shut boiler down when both heating and domestic circulations are up to temperature.
(6) Boiler control and heating circulation control by means of valve on by-pass between flow and return mains giving mixing valve effect. No control on domestic supply.
(7) Boiler control and thermostat in heating flow controlling mixing valve to give constant but lower temperature than boiler, with separate domestic control.

All the above methods are only applicable when the whole heating system is controlled from one point. When zone or aspect control is used, however, different methods are employed.

Fig. 14 shows a simple north and south aspect control, and again here either room or return thermostats or variostat can be used as desired.

An improvement on this method is to use a separate loop main to which the radiators are connected and to fix the motorized valve on this loop. This arrangement has the advantage that the closing of the motorized valve does not stop the main circulation and thus a quicker response is obtained when the valve re-opens, at the same time it prevents large and rapid changes in boiler temperature which enables the boiler to maintain a more even output and thus improves the overall efficiency and economy of the plant. Fig. 15 shows a typical motorized valve.

Before leaving this section on lay-out a few words on the positioning of thermostats will not be out of place. The average boiler has several tappings, provision being made for such fittings as thermometers, pressure gauges, safety valves, &c., in addition to the flow and return pipes,

and the selection of a suitable place for the thermostat depends on several factors.

Assuming that we have a choice (by no means always the case) let us consider what we want the thermostat to do. First, it must close the damper when the water reaches the maximum desired temperature, therefore it must be fitted in the hottest water—*i.e.*, at the top of the boiler. Secondly, it must answer quickly to changes of temperature, therefore it must be in moving water. Experience has proved that the best all-round position is in

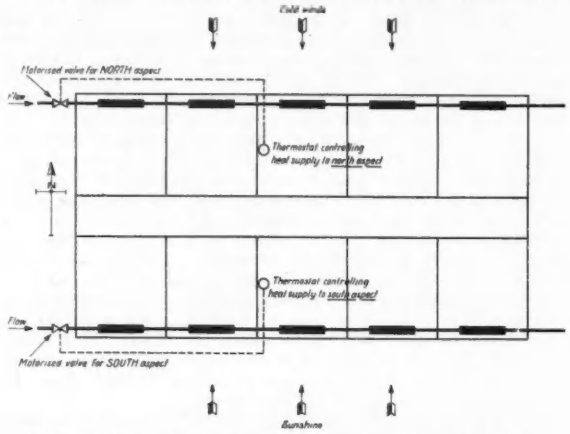


Fig. 14.—Diagram Illustrating the Principle of Aspect Control.

the flow pipe between the boiler and main stop valve because the hottest water is naturally that leaving the boiler, and also because it is moving. The reason for putting it between the boiler and stop valve is to ensure that the dampers will very soon shut if the fire should be lit whilst the valve was closed.

It is the usual practice with sectional boilers to take the flow pipe off one of the back sections and bring the return into one of the front sections. In such a case it is not good practice to fix the thermostat in the top of the front section, because the natural tendency of the water is to flow diagonally through the boiler from bottom front to top back. The water in the top of the front sections out of the line of circulation being almost stagnant does not give a true indication of the temperature of the water leaving the boiler, and has the effect of making the thermostat appear to have a large differential.

The same care in selecting the position of a thermostat controlling a valve is also necessary. For instance, it would be useless to fix the thermostat in the same main and near to the *valve*, because as soon as the valve opened hot water would reach the thermostat and shut it again before the water had had time to reach the radiators or do any useful work. The thermostat must therefore always be fitted on the opposite main to the valve, and as explained earlier, the best place is in the return main so that it feels the effect of any variations in heat loss in the building.

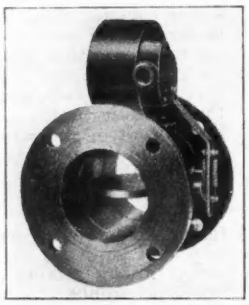


Fig. 15.—"Satchwell" Motorized Valve.

In the case of domestic hot water calorifiers or cylinders, the thermostat should be fitted in the secondary circulation. It is, however, usually fitted in the top or bottom of the storage cylinder, although some engineers prefer it to be fitted in the secondary return main, on the ground that in this position it will open the valve or dampers as soon as any water is drawn off. In the Author's opinion, however, the best place is in the storage cylinder, about a quarter of the total depth above the bottom, because, as you know, a coke-fired boiler continues to give an appreciable heat output for a little while after the dampers are shut, and the cooler water below the thermostat can absorb this heat usefully. At the same time it will open the dampers as soon as the incoming cold water reaches the thermostat, while there is still three-quarters of the storage to be drawn on while the fire is burning up. These advantages will, of course, only apply to a system where the secondary circulation is by gravity and stratification can occur. If the secondary water is circulated by a pump it will be practically the same temperature throughout, and therefore the thermostat can be placed in any convenient position in the secondary circulation. The best height for the control is about 3 ft. 6 in. above the floor, but as it would be liable to damage and interference at this height it is generally fitted about 6 ft. up.

While on the subject of room thermostats it might be of interest to mention that a room thermostat fitted out of doors (protected from the weather, of course) can be used as a frost guard to open up the heating when the outdoor temperature falls to a predetermined low level and so prevent damage to stock, &c., in factories and warehouses where the heating plant is normally shut down at nights and week-ends.

Another arrangement which is sometimes employed in flats is to fit two room thermostats, one set to operate at the normal day temperature and the other set lower to switch over from the day to night by a time switch.

(*c*) *Selection of Equipment.*—After a decision has been reached as to which scheme of control is most suitable for a particular plant comes the selection of the equipment—*i.e.*, the type and make of damper motor, thermostats, valves, &c. Many factors enter into these questions, chiefly suitability for purpose, power, sensitivity, size, simplicity and reliability, operating medium, and last, but by no means least, cost.

Other factors such as damp, dirt, and, in the case of outdoor instruments, weather, also have to be taken into account. When thermostats are fitted in public buildings, schools, and factories, provision for locking the adjustment against tampering has to be provided.

The usual practice is to use dust-tight equipment of ample power and robust construction in boiler rooms, and if electricity is the operating medium, all terminals should be enclosed in dust and water tight connection—boxes because coke dust, as you know, is a conductor, and quite a thin film can cause sufficient leakage to put the control out of operation even if it does not blow the fuses.

It frequently happens, especially with new buildings, that the thermostatic controls are installed while the plant is still in course of erection and before power or heating are on, and the final adjustments to thermostats and dampers cannot be made until the fires are alight and the system somewhere near full working temperature.

The method of testing is as follows: First, each damper motor and valve, together with its controlling thermostat, is checked over separately to see that its electrical connections are correct. Then they are checked together to ensure that the sequence of operations is correct. Thirdly, the dampers are adjusted to give the correct draught. Fourthly, the operating temperatures and differential of the thermostats are checked both against a standard thermometer and against the boiler thermometers, and finally, the "shut down" setting of the dampers is checked to ensure that the temperature does not rise appreciably after the dampers have closed, a small but important point, especially if the chimney pull is high and there are air leaks below the grate level.

The fourth test—*i.e.*, checking the thermostat—operating temperature against the boiler thermometer is very necessary, especially when the thermostat is fitted in the flow main and the thermometer is in the front section, because, as explained earlier, if the flow pipe is fitted near the back of the boiler the water in the front section is practically stagnant and a considerable difference in the temperature at the two points can occur. This has often led to complaints that the thermostat was wrong, although, in fact, tests have proved that the thermometer was the real culprit. Boiler thermometers, I am sorry to say, are frequently inaccurate, due principally to bad fitting. As you probably know, they usually have a rather short immersion stem and when fitted in a tapping larger than their own necessitate a bush which still further shortens the effective length and, in extreme cases, the bulb may be surrounded by a pocket of air held under the bush and unable to disperse.

Incidentally, this point of proper immersion is a very good argument for using long stem thermostats, which, besides being more sensitive, ensure a truer operating temperature.

No matter how good a control installation is when installed, it will not continue to give the satisfactory service which the user has a right to expect unless treated with a reasonable amount of care and regularly cleaned and adjusted by men who understand their construction and operation. A regular maintenance contract with the Contractors who install them is therefore a sound investment which amply repays its small cost and gives the user the satisfaction of knowing that his controls are kept in perfect working order.

[*The discussion which followed will be published in a forthcoming issue.*]

THE STARMAIN

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French Gas Industry

Review of the 60th Congress of the Union Syndicale de l'Industrie Technique du Gaz en France

Continued from p. 168.

The Accurate Determination of the Calorific Value of Gas

A Paper on gas calorimetry was presented by R. Duchêne. The definition adopted in France for the gross calorific value of a gas at constant pressure is the number of calories produced by the combustion at constant pressure of 1 cubic metre of gas measured dry at 0° C. and 760 mm., the gas, the air for combustion, and the products of combustion being reduced to 0° C. and 760 mm., the water present as moisture or derived from the combustion of the gas being condensed and the waste gas being at rest. These conditions are not realized in the experimental determination of the calorific value of gas by means of the Junkers calorimeter since the determination is carried out at atmospheric temperature. The Author has developed graphs showing the correction to be applied under various conditions of atmospheric temperature, effluent-gas temperature, and wet bulb depression of the combustion air. To reduce the correction to a minimum, it suffices to maintain the effluent-gas temperature at about 2·5° C. above atmospheric temperature. Under these conditions, if the moisture content of the air corresponds to a wet bulb depression of 2° C., the correction is virtually *nil*.

A lengthy description is given of the modern calorimetric installation of the Paris Gas Company which is adapted to a high degree of precision. A modified form of Junkers calorimeter is employed with special provision for the thorough mixing of the water prior to its arrival at the outlet thermometer. A meter of the modified Boys bell type is employed except for work of the greatest precision for which a water clock is used, the volume of which was accurately determined from the weight of water required to fill it. The gas correction factor is automatically recorded by means of a specially designed instrument.

Consideration is also given to the various principles involved in the different types of recording calorimeters. In spite of the perfections which have been introduced into such instruments in recent years, the final arbiter must always be a determination in a non-recording instrument.

A heat balance is finally given for a calorimetric determination effected with a Junkers calorimeter.

Contamination of Holder Water and its Cure

L. Sabrou discussed the phenomena which give rise to the contamination of gas with sulphuretted hydrogen in the holder, and confirmed the generally accepted views that bacterial action on sulphates present in the water is the cause. After a review of the various published methods for the elimination of such contamination, a description was given of a method of cure adopted in the case of a holder at the Cornillon works of the Paris Gas Company. The holder, which has four lifts, has a capacity of 8 million cu.ft., and its tank contains 13½ million gal. of water. In view of the beneficial effects which had been obtained by the Author [see "JOURNAL," 1935, 211, 370] by the use of ammonia-still effluent for the treatment of devil gases in order to render them innocuous, it was decided to treat the holder water with similar effluent. The ammonia-still effluent was brought to the holder in tank wagons, where it was discharged into a tank from which it was drawn by a pump and sprayed into the holder at a height of 26 ft. at the rate of 6,600 gal. per hr. The water in the holder tank was treated as follows: The holder having been lowered to an extent corresponding to a capacity of 250,000 cu.ft. of gas, a radial pipe-line was laid on the crown to enable the effluent to be brought to the purging valve. Effluent was also brought by pipelines up to the holder gangway. The two pipe systems were connected by a flexible rubber hose intentionally left very slack. The flexible hose served the double purpose of providing a supple joint following the movements of the holder caused by diurnal temperature variations on the crown and of providing a safety syphon to prevent any return of gas in the event of a stoppage of the effluent pump. The effluent, brought to the centre of the bell of the holder, fell by gravity into the latter from a height of 32 in. and gradually mixed with the holder water undergoing treatment. It thus formed a dilution cone, the point of which was directed towards the purging valve. A period of about one month was required before the contents became uniform throughout the holder tank. Introduction of effluent was made over a period of 18 days and involved the admission of approximately 400,000 gal. of the effluent. Subsequently, the cups were treated, 350,000 gal. of effluent being employed. The total quantity of effluent used was thus approximately 6% of the volume of the holder water.

The result of the treatment was quite effective, and the gas in the holder no longer gave a reaction for sulphuretted hydrogen. It will be evident that the treatment did not involve the purchase of any chemical reagents.

More effective treatment, resulting in a more rapid attainment of a uniform admixture, could be realized if holders were provided with appropriate arrangements for the introduction of effluent.

The effect of the effluent is due partly to the antiseptic properties of the tar acids contained in it, and partly to the oxidizing effect of the oxygen dissolved in it. Any fears that corrosion problems might arise through the use of ammonia-still effluent are groundless.

Studies on Woodall-Duckham Continuous Vertical Retorts

Y. Quéret and D. Silvestre de Sacy described work undertaken at Clichy with a view to the ensuring of the efficient operation of Woodall-Duckham continuous vertical retorts on difficult coals and to the production of strong compact coke. When vertical retorts were first installed at Clichy, English and Saar coals were treated almost exclusively. It is now necessary to handle 80-100% of French coals and certain operating difficulties developed with the fat coals of the Pas de Calais district.

The question of scurfing is an important one in view of the damage which may result to the retort walls if excessive scurfing temperatures are employed. Moreover, scurf formation is most abundant when top temperatures are highest. It is therefore of interest (1) to reduce scurf formation by suitable means—*i.e.*, by the reduction of top temperatures by use of upward heating and by use of trunk feeds and (2) to reduce the interval between successive scurfings.

The essential advantage of upward heating lies in the more ready descent of the coal. The extent to which coals swell increases with the rate of heating. In upwardly heated retorts the initial rate of heating of the coal is slower and the fact that the highest temperature is at the bottom nostrils leads to less decomposition of hydrocarbons and less scurf formation in the upper parts of the retort. The scurf deposited lower down is readily eliminated during scurfing.

The temperature gradient in the bricks at the top of the retorts is less than it is in downwardly heated retorts and this results in less erosion and consequently in a longer life of the retorts. Further benefits in these directions were secured, during reconstruction, by a lowering of the level of the horizontal waste gas flue at the top of the retorts and, finally, by a lowering of the level of the upper nostrils. This enabled an increase to be made in the number of firebrick courses at the top of the retorts, an advantage, since firebricks are less sensitive to thermal shock than are silica bricks.

Attention having been drawn to their possibilities, a few Woodall-Duckham trunk feeds were installed and, the results having proved very satisfactory, their use was gradually extended. When the trunks are removed to enable retorts to be scurfed, an abundant deposit of frothy scurf is noticeable on the retort walls. It is readily detached, leaving the walls perfectly clean. The adoption of trunk feeds has enabled the interval between scurfings

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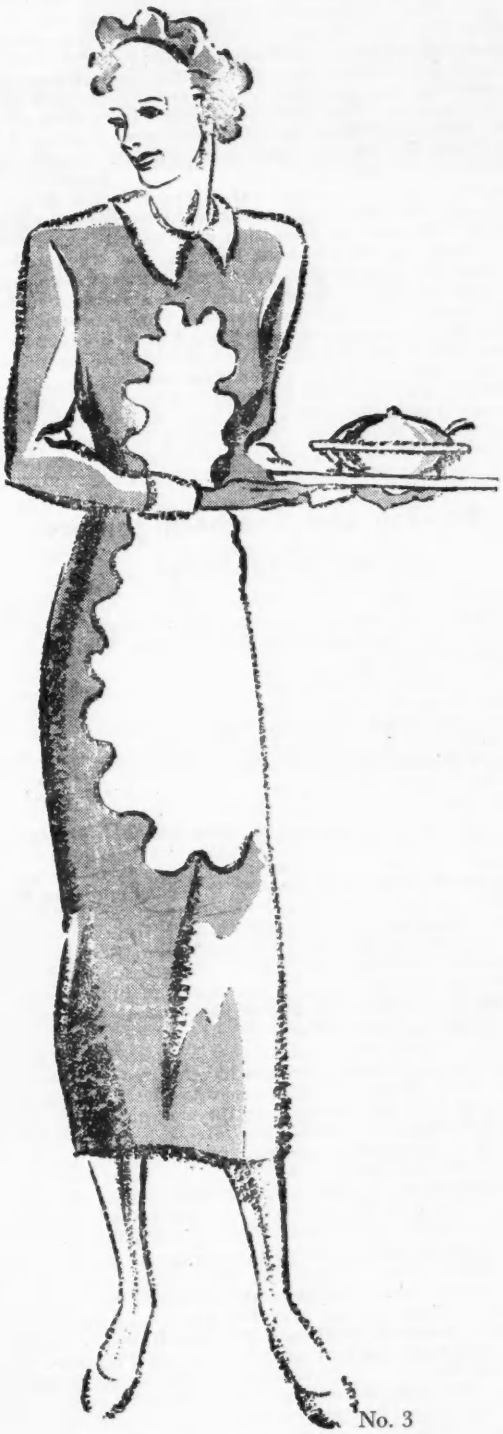

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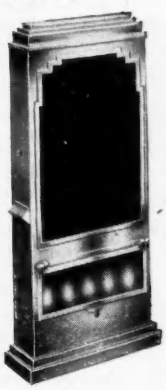

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to be increased and the operation of scurfing to be facilitated due to the absence of thick scurf deposits at the top of the retorts. The scurf in the middle of the retort is readily burnt off without the necessity of rodding.

Trunk feeds have an effect both on the gas and on the tar. The therm yield is increased and the gas, which has a higher calorific value, contains more carbon dioxide, methane, and unsaturated hydrocarbons but less hydrogen and carbon monoxide than when trunks are absent. The tar contains less naphthalene and anthracene and has a higher viscosity. The benzole recovered from the gas contains more paraffinic and naphthenic hydrocarbons. These features indicate that less cracking occurs when trunk feeds are employed.

Experiments were carried out in order that it might be ascertained for how long retorts could be worked without scurfing. Difficulties in operation were usually encountered after a working life of about 30 days, but when rodding was practised the retorts resumed normal working and could then be run for long periods with uniform regularity of coal travel. Several retorts were run for periods exceeding 100 days and, in one case, a period of 226 days elapsed before coal travel ultimately became so difficult that the retort had to be shut off for scurfing.

It is thought that the difficulties which arise after 3-4 weeks are due to the spontaneous detachment of scurf, this giving rise to blockages. If this scurf is dropped by recourse to rodding a more or less regular travel of the coal again sets in and continues until further scurf develops to a thickness such that more becomes detached. It appears that it is a useful point to increase the scurfing interval though not to an undue extent since the result might then be that a number of retorts would simultaneously require scurfing and this might lead to a reduction in the day's make of gas. The experience gained in these tests led, however, to a decision to increase the normal scurfing interval from 28 days to 40 days.

The final section of the Paper is devoted to the control of blending in continuous vertical retorts with a view to the selection of mixtures of coal which give easy travel and, at the same time, produce a satisfactory coke. Use is made of swelling tests carried out in a modified Audibert dilatometer. For easy travel the blend should show a swelling of less than 100% when heated at the rate of 2° C. per minute. To enable a satisfactory coke to be made, the percentage swelling should exceed 30% and, at the same time, the fissuration index (percentage of volatile matter in the semi-coke obtained in the swelling test) should lie between 18 and 22%. With a higher index too much shrinkage occurs and the coke is fragile or friable while, with a lower index, shrinkage is inadequate and irregular coal travel will result.

(To be continued.)

London and Southern Juniors

Visit to Oil Works

Members of the London and Southern District Junior Gas Association spent an interesting afternoon on Saturday, Oct. 23, inspecting the Wandsworth Works of the Vacuum Oil Company.

The works have a frontage on the river, and crude oil is brought up in barges, from which it is pumped into reservoirs prior to refining. These processes the visitors were enabled to see, together with the final packing up of various quantities of oil into different types of container. A method, which is being more generally adopted at the present time for many other things besides oil, is to seal it up in paper or cardboard containers, suitable for pouring immediately into the engine sump. Other types of container include 4-gallon buckets for overseas markets (on the assumption that the bucket will come in handy for domestic purposes afterwards!). Larger quantities are run into drums and barrels, which have to be thoroughly cleaned, dried, and re-painted before filling. The members watched the washing and painting processes, which are carried out mechanically. Many grades of lubricating oil, including shock-absorber oil, are prepared at these works, which are very up-to-date.

Finally, a visit was paid to the laboratory, where the different tests to which the oils have to be subjected are carried out. These include viscosity tests as well as mechanical tests to ensure that there is no possibility of the oil breaking down under the intense heat and friction to which it is subjected in use. Such tests as these are particularly important in view of the use to which the oils are put in connection with the fighting forces. Both Admiralty and Air Ministry, it is understood, stipulate stringent standards to which all oils must attain.

Following the inspection of the works, the visitors were entertained at tea, when the PRESIDENT (Mr. R. N. LeFevre) voiced the thanks of the members for the facilities provided for looking over the works and also for the hospitality extended to them. The Gas Industry, he said, was a very large user of oil. In his own Company they had seven hundred road vehicles at work, using 10 million gallons of benzole per annum; from this they could judge the amount of lubricating oil required. In addition, they used over 8 million gallons per annum for gas-making purposes as well as a considerable quantity for the lubrication of moving plant generally. Mr. LeFevre also thanked Dr. Harris (who is in charge of the laboratory) and the guides who had conducted them round the works for giving up their Saturday afternoon in this way.

Mr. T. W. ALLEN (Manager of the Wandsworth Works of the Vacuum Oil Company) expressed pleasure at the Association's presence that afternoon. It would have pleased him far more, he observed, if this visit had been arranged during working hours, so that they could have gained a better idea of the processes involved; and in this connection he extended to them a cordial invitation to come along on another occasion, at a time when the works were in full operation. The works employed 170 people and included eight different sections.

Scottish Western Juniors

New Paisley Holder Inspected

On Saturday afternoon, Oct. 23, members of the Scottish Junior Gas Association (Western District) were afforded an opportunity of inspecting the new waterless gasholder at Paisley. A photograph of this holder, which was erected by Messrs. Robert Dempster & Sons, Ltd., will be found on p. 338 of this week's issue of the "JOURNAL."

Following the visit, the members were entertained at tea by the Paisley Corporation, Bailie McLean presiding. With him on the platform were Bailie Black, Convener of Paisley Gas Committee, Mr. A. S. Nisbet, Engineer and Manager, Mr. MacLaren, President of the Scottish Junior Gas Association (Western District), Mr. Freshney, Technical Assistant, and Mr. W. Kirk, Secretary of the Scottish Junior Gas Association (Western District).

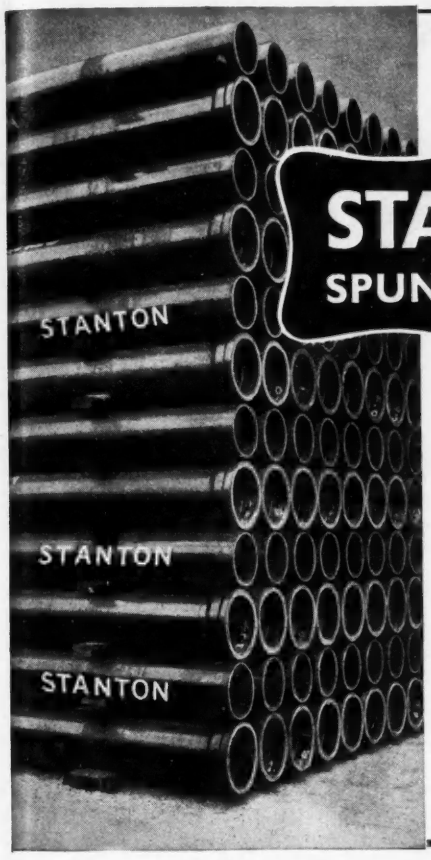
Bailie McLean extended a most hearty welcome to the members.

Mr. R. A. MacLaren, President of the Association, expressed thanks for the facilities granted to the members. The Gas Committee of Paisley were to be congratulated on their courage and foresight in making provision for an even greater amount of gas in Paisley. He had listened to Bailie McLean's remarks and he was very much impressed with the manner in which the Paisley Corporation were tackling the public services question. He also expressed, on behalf of the Association, their thanks for the hospitality which they had so kindly provided.

Bailie Black, Convener of the Paisley Gas Committee, said that this would be his last opportunity, as Convener of the Gas Department, to welcome the Juniors, as he was taking over the Convenership of the Electricity Committee.

The Chairman then called upon Mr. Nisbet, who said that it was a pleasure to have the Juniors present that afternoon. The first visit to the Works took place in 1910, the second in 1917, and the last in 1923. Looking back upon these days, he had seen many changes and one which impressed him most of all was the numbers bringing their own cars. Continuing, Mr. Nisbet said that there was another change which was not so good and that was relying on the Government for a subsidy in times of depression. He thought that revenue-producing undertakings should provide the capital necessary for their wants because when a subsidy was granted, there were numerous conditions and stipulations laid down, the results of which could be seen in the coal industry at the present time. There was now a Central Committee dealing with the coal and they had no choice in the selection of their coals and that the price was stipulated by them. It behove the Juniors to exert all their power to preserve the integrity of the Industry.

Mr. Kirk, with the greatest of pleasure, asked the members to accord to Bailie McLean a very hearty vote of thanks for officiating as Chairman that afternoon. He also thought that he would be expressing the wishes of the Association in wishing Mr. Nisbet long life and prosperity when the occasion arose for him to vacate the position of Engineer and Manager.



Stanton-Wilson Jointed Pipes rounding bend without Specials

STANTON
SPUN IRON PIPES

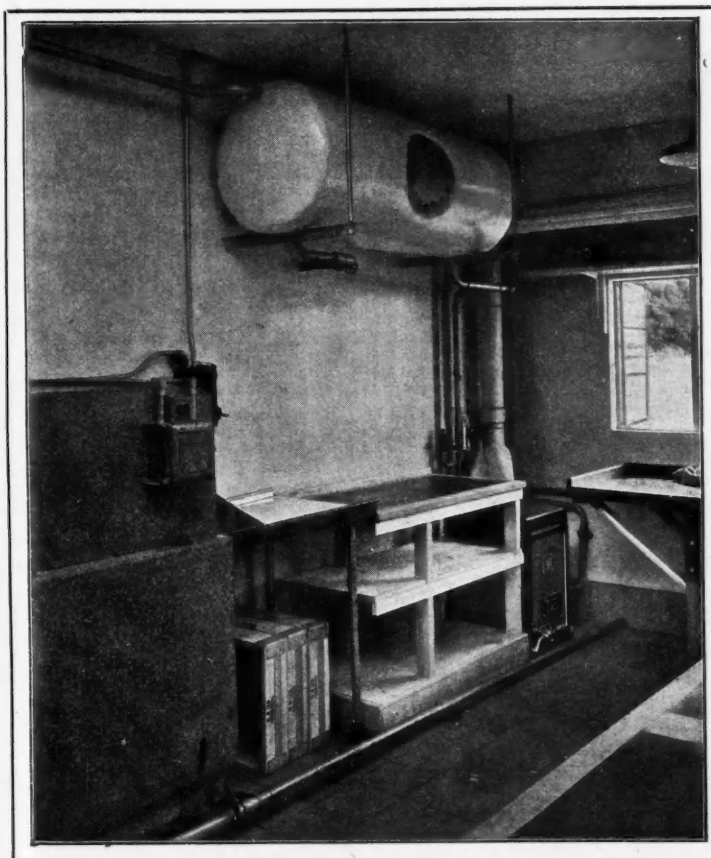
Ductility and Toughness Greatly Increased

Complete elimination of "chill" and subsequent annealing, increased resistance to shock and impact, and a marked advance in ductility and toughness are qualities found ONLY in pipes made by the Delavaud-Mairy ferro-silicon process.

Stanton Spun Iron Pipes are now not only stronger and better than pipes made by any other process, but they are also a considerable improvement over pipes previously cast by us in metal moulds without the use of the ferro-silicon process.

When laying metal-cast spun pipes, make sure they are made by the Delavaud-Mairy ferro-silicon process, the *only known* method of eliminating "chill" and subsequent annealing.

The Stanton Ironworks Company Limited,
Near Nottingham



CULINARY HOT WATER SUPPLY

for HOTELS & RESTAURANTS

The use of Mechanical Dish-Washers wherein the process of cleaning plates and dishes is accomplished without hand drying of crockery, necessitates a supply of scalding water for the final process.

Pottertons' Automatic Gas Fired "REX," "EMPIRE" and "EMPEROR" Boilers are specially designed to meet this need, of which the illustration here shown is an example.

Pottertons' "REX" Gas Fired Water Heater with 100 gall. storage supplying water at 190° Fahr. for Messrs. Dawson Bros.' Plant at a Holiday Camp at Lowestoft. By this means the crockery becomes so hot when it leaves the Machine that it dries in a few minutes.

Catalogue on Request.

THOMAS POTTERTON (Heating Engineers) Ltd., Ravenswood Rd., Balham, London, S.W. 12
Telephone : Balham 1244-5-6
Telegrams : Potterton, Toot, London

Trade Notes

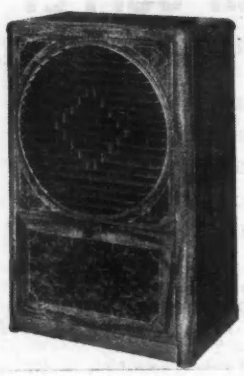
Gas Air Heating and Conditioning Units.

It is only in comparatively recent times that the subject of air heating and conditioning has come under consideration in this country, and then only on a scale, as a rule, which involves elaborate and costly plant. Interest will therefore be aroused in "unit" heaters for this purpose which have recently been developed by Arthur Docking & Co., of Harmood Street, N.W. 1.

Two main types of equipment are available—a direct heater for factories, workshops, &c., and an indirect unit for shops, halls, cinemas, and even residential flats.

The first type goes by the name of the "Aerozone" air heater and conditioner; it is an overhead unit and embodies a number of particularly interesting features. A row of five atmospheric gas burners provides the heating agent, the hot products passing upwards through ducts to a point behind the fan which occupies the upper portion of the unit. At the back is an "ozonater" which, by an electrical discharge, or ionization, process, supplies "ozone" or purified air to the same point— where they are both picked up by the fan and ejected into the workshop. The whole system is entirely automatic, being controlled by an air thermostat, which would normally be set to maintain an air temperature of about 65° F., this being easily achievable even when the outside temperature is as low as 30° F. There is a magnetic valve on the gas supply to the burners, while a safety cut-off is also provided in the event of a failure. The operation of the room thermostat, previously referred to, also brings the fan into motion at the same time as it causes the main gas burners to ignite from the pilot. Such a heater as this would probably be sufficient for a workshop occupying 20,000 sq.ft. of floor space; and, while that in which we had the opportunity of seeing one of these heaters at work was much smaller, the pleasing atmospheric conditions were most noticeable. The heater has a gas consumption of 1 therm per hour, with an output of 100,000 cu.ft. of conditioned air per hour to maintain the workshop at the figure of 65° F. A ½-h.p. electric motor is required to drive the fan, while the "ozonater" uses one unit of electricity in fifty hours. The fan and "ozonater" can, of course, be brought into commission quite independently of the heating part of the apparatus, thus rendering the unit ideal for summer air conditioning.

We believe that in certain quarters hands will be lifted in pious horror at the very idea of *products* being blown into the breathable atmosphere in such quantities. To them we would say: "Ask the canary." No; we are not being facetious. As is well known, the canary is a creature particularly susceptible to "atmosphere." So a canary was placed in the workshop adjacent to one of these conditioning units some weeks ago—and to-day it is just as chirpy as ever (though we believe it views its surroundings with some disfavour æsthetically!). As a matter of fact, the atmosphere produced by the "Aerozone" has been analyzed, and it showed CO—*nil;* and CO_2—just under one-fifth of 1%—hardly a serious quantity.



The "Coroaire" heater, which stands about 3 ft. 6 in. high.

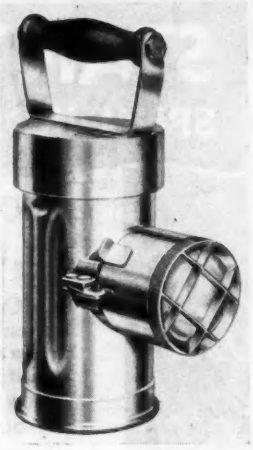
This unit is also available in a half-therm-per-hour size. It should be mentioned that A.C. current is necessary for the "ozonater," and in D.C. districts, therefore, a rotary converter is required.

The indirect heater is known as the "Coroaire" and is a handsome appliance of pleasing appearance, and perfectly suitable for use in such places as those for which it is intended. Here again are the same principal features as in the unit just described, save that here, of course, there is a flue, which can be taken straight through the wall and so remains invisible. The heater stands on the ground, and adjustable louvres on the front enable the warmed air to be directed wherever required. An additional feature of this unit is the small "humidifier" which is incorporated; this is periodically replenished by hand and has the effect of keeping the air which is supplied from the appliance slightly moist. The "ozonater" and fan may here again be used without the gas heating section in summer. It is claimed to be capable of keeping a six-roomed flat adequately heated and ventilated. The capacity of this unit is about 40,000 B.Th.U., with a working efficiency of 8%.

The "Coroaire" is not merely a gas heater which looks like a radiogram. It combines all the features of air filtration, humidification, ionization, purification, heating, and forced air circulation, under positive automatc controls, in one attractive unit, capable of heating 10,000 cu.ft. of space, and doing it comfortably, safely, and economically, even in the coldest weather.

An Approved Accumulator Handlamp.

Our readers will doubtless be interested in the new type of "Nife" accumulator handlamp, here illustrated, which has recently been placed on the market by Batteries, Ltd., of Hunt End Works, Redditch. It is claimed to be the only handlamp of its kind carrying full official approval for use in dangerous atmospheres, such as those likely to contain hydrogen, petroleum vapour, coal gas, &c. The Home Office Approval number is F5184/9/N, and the certificate which the makers hold, covering this lamp, states that it was tested and certified as safe for use in such atmospheres as those already mentioned. It is therefore true to say that the certificate in question is equivalent to Group II. "Buxton Certificate," with the addition that the lamp has also been passed as safe for use in the more dangerous gas, hydrogen. Batteries, Ltd., will be pleased to supply further details of this interesting new lamp (known as type NG7) on request.



New "Ascot" Models.

At the recent North London Exhibition, Ascot Gas Water Heaters, Ltd., in addition to their usual range of multi-point water heaters and sink heaters, exhibited two entirely new appliances.

The first of these, the "Ascot" boiling water appliance, Type RS 52/1, is very similar in appearance and size to the normal sink heater but is provided with a temperature selector marked "warm," "hot," and "boiling." If the control, which is situated between the two water taps, is set to "boiling" and the hot water tap opened, boiling water will be available in 40 seconds at the rate of 2½-3 pints per minute. This boiling water is as pure as the water in the mains and has to be boiling in order to be forced out of the appliance; there is therefore no doubt that it is really boiling. On turning the control to "hot" very hot water (raised 100° F. from cold) is produced at the rate of ½ gallon per minute for washing greasy dishes, &c., irrespective of the amount of opening of the water tap. To enable the user to obtain the great benefit of the instantaneous type of water heater—namely, to obtain water at any desired temperature by means of setting of the water tap without any alteration to the gas controls, the temperature control is set to "warm" when very hot water can be obtained at the rate of ½ gallon per minute raised through 100° F. by opening the hot water tap slowly until the gas just lights, or cooler water may be obtained by opening the hot water tap further and increasing the flow to any desired temperature rise, down to 40° F. at the rate of 1¼ gallons per minute. The method of installation and regulation is similar to that of the "Ascot" sink gas water heater, Type R 12/4.

The other new appliance is the "Ascot" bath water heater Type SG 32/1, which represents a determined effort to get away from the ideas associated with the old-fashioned geyser. This heater is provided with a white vitreous enamel case and integral draught diverter (baffler), all small fittings being chromium plated. In fact, the appliance is similar, both in appearance, ease of installation, regulation, and maintenance to the "Ascot" multi-point water heater, Type NEA 32, except that it is a single-point appliance, fitted with a chromium plated swinging spout, a water tap at the inlet to the heater, and—a new feature—a winter-summer temperature compensator. This compensator consists of a porcelain knob projecting from the casing at the right, by the use of which the user is enabled to obtain really hot water at any time of the year, irrespective of the considerable variations in the cold water temperature in summer and winter, without the necessity of having to have the appliance readjusted for such conditions. The "Ascot" bath water heater gives a flow of 3½ gallons per minute raised through 40° F., corresponding to over 2 gallons per minute raised through 60° F.

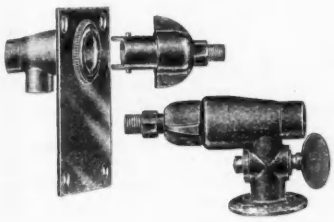
Staveley Coal and Iron Company, Ltd.

The Staveley Coal and Iron Company, Ltd., have now opened a stock yard for the London area, the address being Southern Railway Kew Bridge Goods Depôt, Great West Road, Brentford. The telephone number is Ealing 5422. The Company are carrying at this depôt a stock of sand-spun, metal-spun, and vertically-cast pipes, in addition to a large variety of special castings, from which immediate delivery can be given.

British Oxygen Co., Ltd.

Members of the Industry visiting the Commercial Motor Show, which is to be held at Earl's Court from Nov. 4 to 13, will receive a special welcome at Stand No. 383, where the British Oxygen Company, of Thames House, Millbank, Westminster, S.W. 1, are exhibiting their equipment.

Flex Plug and Socket Connectors.



The increased popularity of portable gas appliances is reflected in the sales of flex plug and socket connectors, of which over a million are now in use. The flex plug and socket connector was developed to supersede the old push-on connector, and to serve a parallel purpose to the electric plug. It was standardized to avoid the trouble which arose in the electricity industry owing to non-interchangeability, a British Standard Specification No. 570 being issued in October, 1934.

As a result of experience, several important improvements have now been incorporated in order to minimize the possibility of damage in use and to prevent failures in connection due to careless and rough handling. The new plug and socket which is completely interchangeable with the original pattern has the following special features:

(1) The external appearance has been much improved by complete streamlining of both socket and plug.

(2) The streamlining has reduced the possibility of the accumulation of dust and dirt on the exterior, and has also had the effect of giving considerable additional strength to the socket, thus preventing guide slots from being accidentally opened or closed.

(3) The plug can now, if desired, be left assembled in the socket in the off position, which will prevent the possibility of damage to engagement lugs if left lying on the floor when disconnected.

(4) The plug has been strengthened by being made from manganese bronze to prevent damage to the engagement lugs of plug due to the latter being dropped.

These connectors are a great advance on those originally produced, since the entire construction is more robust and prevents, as far as possible, damage through careless use.

The illustration shows two of the five types of flex plug and socket now available. In one type a cock is incorporated in the socket to provide, if desired, greater flexibility when cutting down the gas rate, thus avoiding the use of a separate cock on the supply pipe.

Walker, Crosweller & Co., Ltd.: Change of Address.

Messrs. Walker, Crosweller & Co., Ltd., announce that their address on and after Nov. 3 will be Cheltenham, Gloucestershire.

Athletic and Social

Cambridge Gas Company's Recreation Club.

An excellent attendance demonstrated the interest which is taken in the Recreation Club of the Cambridge University and Town Gas Light Company, when the annual meeting was held on Oct. 15. The Chair was occupied by Mr. A. Bowman (Works Foreman), supported by Mr. J. H. Rioch (Engineer and Manager of the Company and Vice-President of the Club), and other officials of the Club.

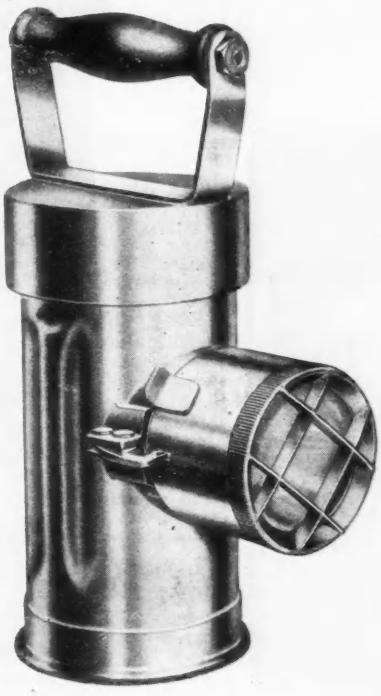
The Secretary's report showed that the Club had been continuously active throughout the year, and had been rewarded by many conspicuous successes in several directions, while the Treasurer presented a statement which not only revealed a substantial cash balance, but also a clear profit on the period under review. Other reports from the Secretaries of individual sections proved that the club was prominently represented in many branches of local sport, and in the various competitions entered had given an excellent account of itself. The social life of the club was adequately catered for by the series of dances held throughout the winter, the annual dinner, members' social, children's party, &c., quite apart from the convivial evenings spent in connection with indoor games matches. Outstanding performances were the winning of the Gilbert Cup by the bowls team for the second year in succession, the rifle section's success in the Winter League Cup Competition, and the personal accomplishment of a member of the table tennis section, who reached the semi-final stage of the Cambridge Federation Knock-Out Cup Tournament.

Hastings Co-Partnership Outing.

The members of the Hastings and St. Leonards Co-Partnership Social Club held their annually Rally and party on Oct. 22 in the ballroom of the White Rock Pavilion. Mr. T. Wise, Secretary, welcomed a large party from Eastbourne and Mr. A. Apel, Director of the Company, presented the various prizes. A merry evening concluded with a concert by well-known artistes, games, and dancing.

NIFE

SAFETY LAMP
type NG7.



THE ONLY LAMP

carrying full official approval for use in Towns Gas, Hydrogen, Petroleum and other Highly Inflammable atmospheres.

Fitted with NIFE Steel Plate Accumulator as standardised in Admiralty handlamps and thousands of Miners' Lamps throughout the World.

Write for publication No. 1337.

TRIALS GLADLY ARRANGED.

BATTERIES LIMITED
HUNT END WORKS REDDITCH

The well-known King's-type Gauge is being used on several Works for bench-mounting, and also in a special adaptation with dial mounted on instrument panel and tank and mechanism behind. This type lends itself readily and with advantage to the need for a large bold-reading dial beyond the scope of mechanical gauges (such as the Dead-Beat type). For bench-mounting, various finishes can be provided, such as black enamel and chromium. In combination with "Precision" Registers finished in similar style an excellent display is achieved. The wood-cased portable Register suggests itself where a panelled decorative scheme is to be matched.

ALEXANDER WRIGHT & CO., LTD. — WESTMINSTER, S.W. 1.

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The chief feature of Stock Exchange business last week was the marked strength of British Funds and other high-class investment securities. There was a considerable increase of buying orders in these sections and prices responded accordingly. Home rails, on the other hand, were neglected and prices weakened. Despite the better tone in American securities, the volume of business in industrials continued on a small scale though several favourites made good gains. It is evident that sufficient confidence has not yet been restored to justify investors in this section operating on a large scale. Towards the close the oil market became more active and many of the leaders were marked up.

The Gas Market had a small share only of the increased activity in high-class securities and, except in one or two directions, prices remained unchanged. Gas Light units were in good demand and closed 6d. higher at 24s. 6d., and two of the Company's fixed-interest stocks also hardened. Imperial Continental fluctuated throughout the week and finally finished 2 points up at 137½. Plymouth and Stonehouse recovered the 2 points lost a week ago, business being recorded at 5½ points higher. Commercial dropped another 2 points to 85½. At the Provincial Exchange, Newcastle units reacted 1½d. on a narrowing of the margin, and Sheffield ordinary closed a point lower at 146. There were no changes in the Supplementary List.

At the time of writing there are a few fairly large parcels of gas preference stocks and shares on offer, most of which give a gross flat yield of over 4%, and among these are the following:

Amount.	—	Price.	Gross Flat Yield.
£			£ s. d.
10,000	Associated Gas and Water (Red. 1952) £1	20s. free	4 0 0
10,000	Gas Light 3¾% (Red 1970)	103	3 13 0
25,000	Severn Valley 4½% Cum. £1 (Six months' dividend payable April 1)	20s. 6d free	4 8 0
29,790	Sheppy 4% (Four months' dividend payable next March)	96 free	4 3 9
5,000	United Kingdom 4½% Cum. £1	21s. 9d.	4 3 0
5,000	,, 4% 1st Cum. £1 (Red. 1951 at 20s. 6d., first dividend payable Dec. 1 next on the instalments)	20s. 6d.	3 18 0

The Directors of the Bournemouth Gas and Water Company are issuing for sale by tender £50,000 maximum dividend (7%) Stock at a minimum price of £161 per £100 stock, yielding at this price £4 6s. 11d.%. The last day for receipt of Tenders is Monday, Nov. 8, at 11 a.m.

Current Sales of Gas Products

The London Market for Tar Products.

LONDON, *Nov.* 1.

Prices of Tar Products in the London market remain at the following levels:

Pitch, 38s. per ton f.o.b.
Creosote, 6d. to 6¼d.
Refined tar, 3¾d.
Pure toluole, about 2s. 5d.; pure benzole, 1s. 9d.; 95/160 solvent naphtha, 1s. 8d.; 90/160 pyridine is said to be 11s. to 12s.; all per gallon naked at makers' works.

Tar Products in the Provinces.

Nov. 1.

The average prices of gas-works products during the week were: Gas-works tar, 24s. 3d. to 29s. 3d. Pitch—East Coast, 37s. to 38s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 37s. to 38s. 6d.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4¾d. to 4½d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 4s. 1½d. to 4s. 3d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Oct.* 30.

There is still a lack of new business but quotations are fairly well held.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch is quietly steady at round 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is being quoted freely at 3d. to 3¼d. per gallon free on rails for export, and 3½d. to 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil is in steady call with prices unchanged as under: Specification oil, 5½d. to 5¾d. per gallon; low gravity, 6¼d. to 6½d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—This product is still quiet, although quotations are unchanged as follows: Pale, 97/99%, 3s. 10d. to 4s. per gallon; dark, 97/99%, 3s. 6d. to 3s. 8d. per gallon; and pale, 99/100%, 4s. 3d. to 4s. 6d. per gallon; all *ex* works in buyers' packages.

Crude naphtha finds a ready outlet at round 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha is changing hands at 1s. 5d. to 1s. 6d. per gallon for 90/160 grade, and 1s. to 1s. 1d. per gallon for 90/190 heavy naphtha.

Motor benzole is valued at 1s. 4d. to 1s. 4½d. per gallon.

Pyridine.—Values show an increase at 11s. to 12s. per gallon for 90/160 grade, and 12s. to 13s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9½	to	0 10	per gallon at works
Motor ,,	1 3	,,	1 3½	,, ,, ,,
90% ,,	1 4	,,	1 4½	,, ,, ,,
Pure ,,	1 8	,,	1 8½	,, ,, ,,

Contracts Advertised To-Day

Resetting Retorts.

Sidmouth Gas Department. [p. 378.]

Tar Extractors.

Blackpool Gas Department. [p. 378.]

Tubes and Fittings.

Heywood Gas Department. [p. 378.]

THE GLOVER-WEST SYSTEM

GETS THE MOST OUT OF THE COAL

The ease with which heat can be concentrated or distributed at will in the Glover-West vertical retort setting makes possible just that heat treatment required by the particular gas coals available. And this applies to recognised carbonizing coals throughout the world. Many of them have been investigated under full-scale working conditions in the test installation on the research gas plant at our Manchester works.

GLOVER-WEST

CONTINUOUS CARBONIZATION IN VERTICAL RETORTS

WEST'S GAS IMPROVEMENT CO. LTD • MILES PLATTING • MANCHESTER 10

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Oct. 29	Rise or Fall on Week.	Transaction Lowest and Highest Prices During the Week.
1,767,439	Stk.	Sept. 6	8	8	Alliance & Dublin Ord. ...	165—170	...	...
374,000	,,	June 21	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
558,890	,,	Aug. 9	7	7	Barnet Ord. 7 p.c.	158—163	...	...
300,000	1	Oct. 4	1/9⅜	1/4⅜	Bombay, Ltd.	26/—28/-	...	26/9—27/6
179,915	Stk.	Aug. 9	9⅜	9⅜	Bournemouth sliding scale ...	200—205	...	...
590,407	,,	,,	7	7	Do. 7 p.c. max. ...	158—163	...	...
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...	...
50,000	,,	June 21	3	3	Do. 3 p.c. Deb. ...	79—84	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	116—121	...	...
357,900	,,	Aug. 9	7½	7½	Brighton, &c., 6 p.c. Con. ...	150—155	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	133—138	...	137½
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	127—133	...	...
855,000	,,	Sept. 20	8	7	British Ord.	146—151	...	...
100,000	,,	June 21	7	7	Do. 7 p.c. Pref.	140—145	...	...
350,000	,,	,,	5⅛	5⅛	Do. 5⅛ p.c. 'B' Cum. Pref.	110—115	...	...
120,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...	...
450,000	,,	,,	3⅛	3⅛	Do. 3⅛ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1⅛—2⅛	...	...
100,000	10	6 Nov.'33	4⅛	4⅛	Do. 4⅛ p.c. Pref. ...	1⅛—3⅛	...	...
150,000	Stk.	June 21	4⅛	4⅛	Do. 4⅛ p.c. Deb. ...	79—84	...	...
626,860	,,	July 19	6	6	Cardiff Con. Ord.	125—130	...	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Oct. 4	2/-	2/-	Colombo Ord.	1⅛—1⅞*	...	...
24,510	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	23/6—25/6	...	...
739,453	1	Oct. 4.	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...	...
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...	...
1,775,005	Stk.	Aug. 9	5	5	Commercial Ord.	83—88	- 2	84½—85½
620,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	74—79	...	...
286,344	,,	Aug. 23	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
807,560	,,	Aug. 9	7	7	Croydon sliding scale ...	140—145	...	...
644,590	,,	,,	5	5	Do. max. div.	108—113	...	...
620,385	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	113—118	...	116
239,000	,,	Aug. 9	5	5	East Hull Ord. 5 p.c.... ...	98—103	...	...
185,355	,,	Aug. 9	6	6	East Surrey Ord. 5.p.c. ...	120—125	...	...
176,211	,,	June 7	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	July 5	4	7	Gas Consolidation Ord. ...	20/—22/-	...	...
250,000	1	May 24	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	...
19,255,284	Stk.	Aug. 9	5⅜	5⅜	Gas Light & Coke 4 p.c. Ord.	24/—25/-a	+.6	24/—24/6
2,600,000	,,	,,	3⅜	3⅜	Do. 3½ p.c. max.	82—85	...	83½—84½
4,477,106	,,	,	4	4	Do. 4 p.c. Con. Pref. ...	99—102	...	100—101⅛
2,993,000	,,	July 5	...	3⅜	Do 3⅜ p.c. Red. Pref.	101—103	+⅛	102—102⅜
8,602,497	,,	May 24	3	3	Do. 3 p.c. Con. Deb....	77—80	+1	77½—79
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb....	112—115	...	...
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	111—114	...	112⅛—113⅜
700,000	,,	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb....	94—99	...	97⅜
270,466	,,	Aug. 23	6	6	Harrogate New Cons. ...	115—120	...	...
213,200	,,	Aug. 9	6	6	Hornsey Con. 3½ p.c. ...	118—123	...	...
5,600,000	,,	May 24	8	12	Imperial Continental Cap. ...	135—140	+2	134½—140
223,130	,,	July 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...	...
285,242	,,	Aug. 9	8½	8½	Lea Bridge 5 p.c. Ord. ...	170—175	...	...
75,000	,,	May 24	†10	†10	Malta & Mediterranean ...	150—160	...	...
					Metropolitan (of Melbourne)			
392,000	—	Oct. 1	5⅓	5⅓	5½ p.c. Red. Deb.	100—103	...	...
231,978	Stk.	Aug. 23	5	5	M.S. Utility 'C' Cons. ...	101—106	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	96—101	...	...
360,075	,,	June 21	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5		Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	July 1	3⅓	3⅓	Do. 3⅓ p.c. Rd.Rg.Bds.	96—99	...	...
675,000	Stk.	May 3	†6	†9	Montevideo, Ltd.	91—96	...	92½—93½
250,000	,,	Aug. 9	7⅓	7⅓	North Middlesex 6 p.c. Con.	150—160	...	...
396,160	,,	Aug. 9	5	5	Northampton 5 p.c. max. ...	110—115	...	...
300,000	,,	Oct. 18	†7	†9	Oriental, Ltd....	155—160*	-3	155
468,537	,,	June 7	8	8	Plymouth & Stonehouse 5 p.c.	157—162	+2	160½
621,667	,,	Aug. 9	8¼	8¼	Portsmouth & Gosport Cons.	164—169	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	104—109	...	...
73,350	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
441,275	1	Sept. 20	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	...	22/—22/1½
460,810	1	,,	-/10⅛	-/10⅛	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...	19/9—20/6
133,201	Stk.	Aug. 23	5	8⅛	Shrewsbury 5 p.c. Ord. ...	130—135	...	...
1,371,752	1	Sept. 6	1/2⅜	1/2⅜	South East'n Gas. Cn.Ld. Ord.	23/—25/-	...	23/9
871,636	1	,,	-/10⅜	-/10⅜	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...	20/9
498,818	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/-	...	...
450,000	Stk.	Aug 9	4	4	Do. 4 p.c. Deb.	99—102	...	...
150,000	,,	,,	3⅓	3⅓	Do. 3⅓ p.c. Red. Deb. ...	96—99	...	...
6,709,895	,,	Aug. 9	6	5	South Met. Ord.	100—103	...	101—102
1,135,812	,,	,,	6	6	Do. 6 p.c Irred. Pf. ...	131—136	+1	136
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101	...	...
1,895,445	,,	June 21	3	3	Do. 3 p.c. Deb. ...	75—80	...	77⅞—78
1,000,000	,,	July 5	5	5	Do. 5 p.c. Red. Deb....	110—113	...	110
1,543,795	,,	Aug. 9	6	6	South Suburban Ord. 5 p.c....	120—125	...	122
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	110—115	...	113—114
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	...
250,000	,,	,,	...	§18/9	Do. 3⅜ p.c. Red. Pref.	98—101	...	...
888,587	,,	June 7	5	5	Do. 5 p.c. Deb....	115—120	...	116⅜—117⅛
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	98—101	...	...
200,000	,,	Sept. 20	...	3½	Do. 3½ p.c. Red. Deb.	94—99	...	...
427,859	1	May 3	9⅜	1/2⅜	S. Western Gas & Water Ord.	19/—21/-	...	19/3—19/9
160,523	1	Apl. 19	-/10⅛	-/10⅛	Do. 4½ p.c. Red. Cum. Pf.	20/—22/-	...	...
110,000	Stk.	June 21	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
750,541	,,	Aug. 9	5½	5	Southampton Ord. 5 p.c. ...	111—116	...	113—114½
148,836	,,	June 7	4	4	Do. 4 p.c. Deb.	97—102	...	98
350,000	,,	Aug. 23	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...	...
94,000	,,	June 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Aug. 9	6⅔	6⅔	Tottenham and District Ord.	133—138	...	133—135
409,835	,,	,,	5⅔	5⅔	Do. 5½ p.c. Pref....	121—126	...	124
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	June 7	4	4	Do. 4 p.c. Deb. ...	97—102	...	100—100¾
888,629	1	Oct. 4	6	4	U. Kingdom Gas Cor. Ord.	20/—22/-	...	20/1½—21/-
968,841	1	May 3	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	21/—21/6
745,263	1	June 7	4½	4½	Do. 4½ p.c.2nd Non-Cum.Pf.	17/—19/-	...	17/7½—18/3
1,000,000	Stk.	Sept. 20	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	97⅜
373,939	,,	Aug. 9	7	7	Uxbridge, &c., 5 p.c. ...	138—143	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...	...
1,371,138	,,	Aug. 9	7	7	Wandsworth Consolidated ...	140—145	...	141½—143½
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref. ...	117—122	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	97—100	...	99—99⅞
1,343,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	115—120	...	115¾—117½
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
558,342	,,	Aug 9	7	7	Watford and St. Albans Ord.	138—143	...	140
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...	...
200,000	,,	,,	5⅛	5⅛	Do. 5⅛ p.c. Pref. ...	121—126	...	...
200,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb.	97—102	...	99⅜
100,000	,,	,,	3⅜	3⅜	Do. 3⅜ p.c. Red.Deb.	95—100	...	...

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Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Oct. 29.	Rise or Fall on Week.	Transactions-Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	July 19	6	5	Bath Cons.	120—122	...	...
1,667,250	,,	July 19	5	5	Bristol, 5 p.c. max.	117—118	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	120—123	...	...
274,000	,,	July 19	5	5	Newport (Mon.) 5 p.c.max. ...	101—106	...	...
13,200	12	Sept. 6	8	7	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...	...
13,600	10	,,	6	5	Do. 7 p.c. 'B'	11½—12⅝	...	...
40,000	10	,,	6	5	Do. 7 p.c. 'C'	11½—12⅝	...	...
140,778	Stk.	Aug. 9	5	5	Weston-super-Mare Cons. ...	110—112	...	...
64,338	,,	June 21	4	4	Do. 4 p.c. Deb.	96—98	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	157—160	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Aug. 9	6½	5	Chester 5 p.c. Ord.	104—109	...	...
92,500	,,	June 21	4	4	Do. 4 p.c. Pref.	97—101	...	
36,430	,,	,,	3½	3½	Do. 3½ p.c. Deb.... ...	89—92	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—102	...	...
2,167,410	,,	Aug. 23	6	6	Liverpool 5 p.c. Ord. ...	125—127	...	...
245,500	,,	June 21	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...	...
306,083	,,	July 1	4	4	Do. 4 p.c. Deb. ...	102—104	...	...
106,280	,,	Aug. 9	10	10	Preston 'A' 10 p.c.	206—216	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	147—157	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Aug. 9	8	8	Blyth 5 p.c. Ord.	165—166	...	...
732,000	,,	Aug. 9	5	5	Hartlepool G. & W. Cn. & Nev	117—119	...	...
2,061,315	,,	Aug. 9	5⅜	5	Newcastle & Gateshead Con.	23/3—23/9a	—/1½	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	99—100	...	...
776,706	,,	June 21	3½	3½	Do. 3½ p.c. Deb. ...	90½—91½	—½	...
277,285	,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	105—107	—2½	...
332,351	,	Aug. 23	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Aug. 9	9	6	Derby Con.	140—150	...	...
55,000	,,	June 7	4	4	Do. 4 p.c. Deb.	100—105	...	...
20,000	10	June 7	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Sept. 20	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Aug. 23	6	6½	Sheffield Cons.	144—148	—1	...
95,000	,,	July 5	4	4	Do. 4 p.c. Deb.	100—103	...	...
Supplementary List of Stocks and Shares not Officially Quoted								
202,152	Stk.	Sept. 6	25/-b	5	Ascot Ord.	100—105	...	100—103
128,182	,,	July 5	5	5	Do. 5 p.c. Pref.	108—113	...	...
573,156	1	May 24	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	...
167,506	1	...	...	...	Do. 4 p.c. Red. Cum. Pref.	19/—20/-	...	20/-
253,118	1	...	...	...	Do. 4 p.c. Irred Pref. ...	18/—20/-	...	...
500,000	1	May 24	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/6—21/6	...	...
500,000	Stk.	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
31,035	1	Aug. 23	...	/4½	Associated Utilities 4 p.c. Pref.	16/6—18/6	...	...
100,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	95
17,000	,,	Aug. 23	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	161
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	141—146	...	...
37,440	,,	Aug. 9	10	10	Cam. Univ. & Town 10 p.c.max.	193—203	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	135—140	...	...
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103	...	...
65,000	,,	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163	...	...
198,000	,,	,,	7	6	Do. 'B' 3½ p.c.	128—133	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
130,000	,,	June 21	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Aug. 23	8½	8½	Great Yarmouth 8½ p.c. max.	44—49	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	44—49	...	...
51,160	Stk.	June 7	5½	5½	Do. 5½ p.c. Deb.... ...	120—125	...	...
152,600	,,	Sept. 6	9	8	Guildford Cons.	170—175	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
68,250	,,	June 7	5	5	Do. 5 p.c. Deb.	113—118	...	...
156,600	,,	Aug. 23	7½	7½	Hampton Court Cons. ...	158—163	...	...
73,620	,,	Sept. 6	8½	8½	Luton Cons. 'A'	163—168	...	...
107,960	10	Sept. 20	5½	4	Mid Kent Ord.	8½—9½	...	...
230,940	Stk.	Aug. 9	10	10	Oxford & District Ord. ...	205—210	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	110—115	...	...
126,193	,,	May 3	7½	7½	Peterborough Ord.	159—169	...	...
64,990	,,	Sept. 6	7½	6½	Redditch Ord.	125—135	...	...
166,850	,,	Aug. 9	8	8	Romford Ord.	155—165	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Sept. 20	5	5	Do. 5 p.c. Deb.	113—118	...	...
25,570	,,	Aug. 9	5½	5½	Rugby 5½ p.c. Pref.	125—130	...	...
25,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...	112
42,750	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
10,950	,,	Aug. 23	8	8	Ryde Ord.	158—163	...	...
27,825	,,	Aug. 23	8	8	Shanklin & Ventnor Cons. ...	158—168	...	...
270,086	,,	Sept. 6	7	7	Slough Ord.	135—140	...	...
21,000	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	112—117	...	...
28,872	1	May 24	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...	...
28,866	1	Sept. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...	...
137,730	Stk.	Aug. 9	7	7	Southgate & Dist. 7 p.c. max.	140—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Aug. 23	5	5	Swindon Cons.	106—111	...	...
60,425	,,	June 7	5	5	Do. 5 p.c. Deb.	110—115	...	...
64,380	,,	June 7	5	5	Torquay and Paignton 5 p.c. Pf	110—115	...	...
500,000	1	...	...	...	United Kingdom Gas Corpn. 4 p.c. 1st Red. Cum. Pref.	19/—21/-	...	20/1½—20/4½
130,000	Stk.	Aug. 9	8	5	Wakefield Ord.	120—125	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Aug.	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Aug. 9	6	6	Wolverhampton 6 p.c. Pref....	120—125	...	...
160,000	,,	June 21	5½	5½	Do. 5½ p.c. Rd. Db	108—113	...	...
90,000	,,	June 21	5	5	York 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	July 19	6½	6½	Yorktown (Cam.) 5 p.c Cons.	128—133	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
35,000	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	123—128	...	...

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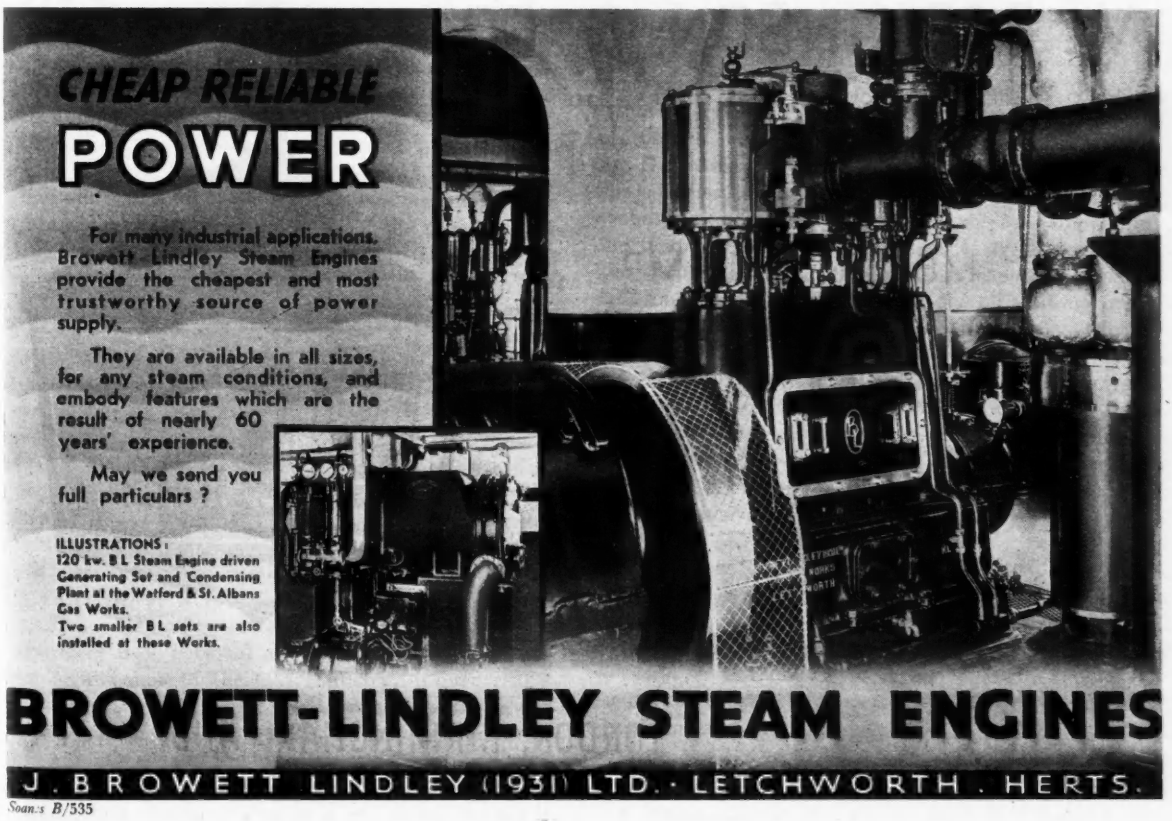
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